AN ETHNOARCHAEOLOGICAL STUDY OF STONE SCRAPERS AMONG THE GAMO PEOPLE OF SOUTHERN ETHIOPIA

By

KATHRYN JANE WEEDMAN

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For my late grandfather, Chester Parmer Weedman, for believing in the eyes as wide as sunflowers.

"Successful reality comes from Dreams, Hard Work, and Tenacious Character."
C.P. Weedman (1913-1998)

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TABLE OF CONTENTS

Abstract of Dissertation Presented to the Graduate School
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Kathryn Jane Weedman

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A controversial and long-standing debate in archaeology is concerned with whether similarities and differences in stone tools represent style (marking the cultural identity of the maker) or function (indicating how stone tools were used). I spent two years among the Gamo hide-workers of southwestern Ethiopia conducting an ethnoarchaeological study of stone tool production and use, which addresses the tenets of the style and function debate.

Ethnoarchaeology offers a position from which to explore the ideologies of living populations and how they invoke meaning into materials. A contextualized approach to ethnoarchaeology unmasks the heterogeneous nature of culture, revealing the necessary background information to infer the meanings behind material variation. My study of the Gamo hide-workers revealed that the local environment and available resources for stone tool production in association with

their maker's social identities interface with geographic and cultural divisions in the landscape. Whether a region is culturally heterogeneous or homogeneous depends on the materials investigated and the scales at which they are examined. Hence, I studied the Gamo stone scrapers in terms of the emically important scales of analysis including regional/interethnic, subregional (north, central, south), political districts, moieties, clans, lineages, domestic groups, and the individual.

My research suggests that exploring similarities and differences in terms of scales of analysis eliminates the necessity for a function and style division and emphasizes that both aspects exist within the material culture of a single ethnic group. It is my hope that pursuing studies such as these will help redefine the ways in which archaeologists make inferences about the past.

CHAPTER 1
THE STYLE AND FUNCTION DEBATE: THE MEANINGS BEHIND STONE TOOL VARIATION

Humans and our hominid ancestors produced stone tools for over two million years and much of the prehistoric archaeological record consists solely of stone tools. Yet, we know very little about how stone tools are related to social identity or how they are manufactured, used, and discarded. Archaeologists concerned with broadening our understanding of stone tools in the ancient past have found studies of modern populations producing and using stone tools invaluable (e.g., Binford 1986; Gould et al. 1971; Hayden 1979; Tindale 1965; White et al. 1977). Currently, Ethiopia is one of those rare places in the world where people continue to make and use shaped flaked stone tools. In southern and central Ethiopia, specialized artisans manufacture stone end-scrapers for processing cow hides for leather products. The continued use of stone tools in present-day populations within southern Ethiopia offers unique opportunities to test a variety of hypotheses related to stone tool technology. It also exposes us to other voices and provides alternative inferences concerning material culture.

The Gamo are one of the ethnic groups in southern Ethiopia who produce stone tools for the scraping of hides. They live in the highland and lowland regions to the immediate west of Lake Abaya (Figure 1-1). The Gamo share a social organization characterized by patri-clans, locally elected village leaders, and hereditary ritual-

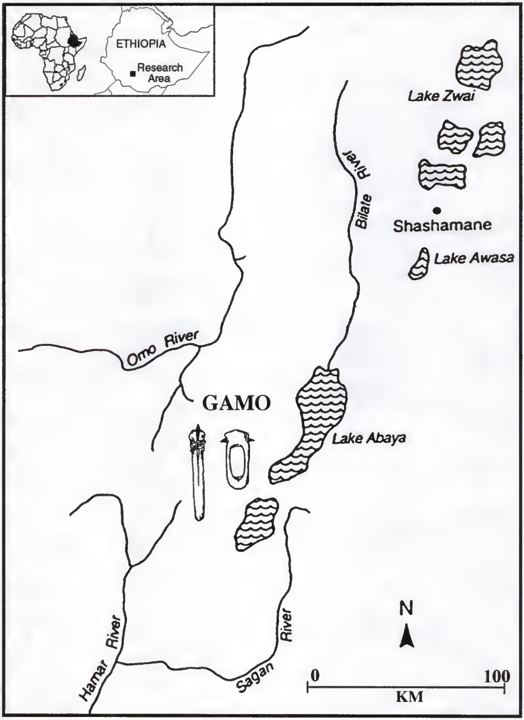


Figure 1-1: Map locating the Gamo territory within the Rift Valley, Ethiopia, and Africa.

sacrificers. Artisans such as hide-workers, potters, and smiths are members of a submerged social-economic group separate from farmers and weavers. The hide-workers' low social status limits them to making their livelihoods from valueless resources such as stones and deceased animals. Stones cause land to be uncultivable and thus render it infertile. A severe insult to a Gamo woman is, "Give birth to stones!" The Gamo non-artisans believe that stones are worthless and bad. Yet, the hide-workers transform these infertile stones into effective tools to produce items used in everyday life including bedding, clothing, carrying bags, saddles, and chairs.

It is remarkable that today people are continuing to make and use stone tools in a world where mechanized industries are expanding rapidly. The continued use of stone tools among the Gamo and other peoples in southern Ethiopia does not indicate a stagnant economic or social situation that we can draw on analogically to describe the past. To imagine that either a past or present society is bounded and ahistorical is a grave error. Rather the Gamo are a collage of social, political, and economic relationships, as is clearly depicted in imagery borrowed from Olmstead (1997):

> Imagine a wet sheet of paper to which watercolors are applied. Each spot of color spreads and mixes with contiguous colors and the boundaries between colors may not be very clear or consistent along the edges of a central color spot. Localized conditions on the page—slight ripple, extra water, a raised section—will affect just how far a color spreads and how much it mingles. …It is this shifting dance of color that I use as a central image when thinking of the thousands of years people have lived upon the surface now called Ethiopia. (26)

The Gamo hide-workers are part of an intricate socio-economic network, which incorporates their families, village members, as well as integration into regional and national relationships. Yet, the Gamo and other southern Ethiopian hide-workers provide a unique opportunity to study a people who make and use stone tools in their

everyday lives. Although the Gamo represent a stratified society, we can draw on their knowledge to provide models for prehistoric hunter-gatherer societies. Ethnography can provide us with some basic patterns of behavior that may be different from those of western-trained archaeologists. It may open new areas of inquiry for researchers to explore in the archaeological record. It is essential that we take advantage of the activities pursued by the Gamo hide-workers to better understand the processes behind stone tool production, use, and discard in an effort to broaden our understanding of human behavior including but not limited to the evolution of craft specialization (Hayden 1990), the role of gender as an organizing feature of craft production (Casey 1998; Gero 1991; Sassaman 1992), and site formation processes (Hayden et al. 1996; Torrence 1986; Schiffer 1982).

My research focuses on one of the most controversial and long-standing issues in archaeology, the style and function debate. Excluding the role of postdepositional agencies, a majority of archaeologists argue that style (marking the cultural identity of the maker) and/or function (indicating how stone tools were used) account for most of the variability in stone artifacts. The production and use of stone tools by the Gamo hide-workers offers an excellent opportunity to explore this long-standing issue concerning the meaning behind differences and similarities in stone tools and how they express human behavior.

Style and Function Debate

Style

Stone tools have been recognized as products of human activity since the fifteenth century (Grayson 1983:5; Trigger 1989:52). However, it was not until the early twentieth century that archaeologists viewed differences in material culture as representative of difference in culture or ethnicity (Childe 1929, 1953; Kidder 1931; Kroeber 1916:7-21; Kroeber and Kluckholm 1952:365-376). Archaeologists hypothesized that synchronic similarities and differences in artifacts represented style. When artifacts were similar to one another, archaeologists felt that they represented people who shared the same culture, and artifacts different from one another indicated cultural differences (Krieger 1944; Wissler 1923:12-20, 47-63).

French archaeologist Francois Bordes (1961, 1973, 1977) systematically designed the European Mousterian typology and was influenced by the paleontological paradigm, *fossile directeur.* Under this paradigm, when the patterns of material culture within geological schemes could not be explained in terms of organic evolution, researchers turned to behavioral expressions of biological differences among human groups as an explanation for variance (Sackett 1968). Bordes' (1961) interest in eliminating the concept that prehistoric people were "brutish half-men" led him to attribute variation among stone tools to style or cultural differences rather than to biological differences. Deetz (1967:44-52, 1968) clarified the latter point through his concept of a mental template. When producing a product the craftsperson forms in his or her mind a mental image or template that is bound by culture specific norms.

This normative/standard view of style holds that formal variation is diagnostic of ethnicity in chronological histories (time and space) (Sackett 1982a, 1982b). Culture was considered to be internally homogeneous and bounded (Jones 1996).

Subsequently two interpretations of the meaning of style developed. Some researchers hypothesize that style actively represents an internal ethnic signaling or iconicism (Hodder 1977, 1982:204-211, and 1990; Larick 1985; Wiessner 1983, 1984 1985; Wobst 1977). The craftsperson intentionally adds stylistic elements separately from the utilitarian elements of the artifact to identify actively the owner of the object. Wobst (1977) argues, in the era of processualist studies, that

> Learned behavior and symboling ability greatly increase the capacity of human operators to interact with their environment through the medium of artifacts. This capacity in turn allows human populations to respond more readily to environmental stress; it improves their ability to harness and process energy and matter; and it diversifies their options of information exchange. (320)

The iconological approach maintains that artifact style represents a conscious intentional action on the part of the maker to produce an object that conforms with and represents his/her ethnic identity. Wiessner (1983) identified two types of active style, emblemic and assertive:

> emblemic formal variation in material culture has a distinct referent and transmits a clear message to a defined target population about conscious affiliation and identity… assertive style is formal variation in material culture which is personally based and which carries information supporting individual identity. (257)

Hodder (1982:48-59) noted that identity might be expressed in mundane utilitarian items, such as stools, hearths, and spears, as well as in decorative items. He also importantly pointed out that there is no clear relationship between the degree of interaction and the material cultural patterning, but rather it "depends on the strategies

and intentions of the interaction groups and how they...negotiate material symbols" (Hodder 1982:185). Iconic studies of styles in archaeology are based primarily on ethnoarchaeological studies of iron spear points and other types of nonlithic material culture. These ethnoarchaeological studies indicate that style reflects different levels of social group membership and practices including: ethnicity (Hodder 1977, 1982:37-56), internal age-grade status (Hodder 1982:77-82; Larick 1985), linguistic/dialect differences (Wiessner 1983, 1985), kinship descent systems (Hill 1970:69-72; Longacre 1964, 1970; Plog 1978, 1983), gender (Casey 1998; Gero 1991; Sassaman 1992; Wadley 1989), and the individual (Wiessner 1983). Hence, the encoded symbolic message of style may not only represent ethnicity but other forms of group membership. Iconological style is something that the craftsperson adds separately from the function of an artifact, and once isolated style has emic significance and represents culture specific behavior.

Others hypothesize that style is isochrestic or inherent in any material form because artisans unconsciously make specific and consistent choices based on options dictated by their culture (Close 1977:7-8, 1989; Sackett 1973, 1982a, 1985, 1986, 1990). Style is learned and transmitted from one generation to the next within a restricted spatial and temporal context. The attributes of style are unconscious/passive but may still serve to identify ethnic groups and boundaries. The ethnic message of an artifact expressed in terms of variability may be actively interpreted, even if it was passively or unconsciously manufactured. This interpretation of variability is based, in part, on archaeological studies of stone tools by Close (1977, 1989) from the North African Epipaleolithic and by Sackett (1989) from Upper Paleolithic assemblages in

France. Close (1977:35-57) recognizes style through eliminating functional and technological vectors. For instance, she considers the nonfunctional attributes of style to include retouch variants, the types of retouch for backing, and the location of the working edge. Sackett's (1985) model of style argues that both style and function are simultaneously present in all artifact forms. The socially bound options dictate the creation of a form and wed function and style in every material manifestation. An example from Sackett (1990) clarifies this point: "a parrot-beaked flint burin is at once a chisel (function) and an object that is exclusively diagnostic of French Magdalenian VI industries (style)" (34). Sackett's (1985, 1989) approach to style advocates that it is a sum of the different components of the overall morphology of an object rather than individual attributes that identify style. Lemonnier (1992) criticizes this approach for lacking "references to the social representations of technology" (91). Sackett's isochrestic style does not explain why one material rather than another is chosen for representation nor how particular objects are related to others in the cultural system. Lemonnier's (1992:98) perspective suggests that it is not possible to segregate style and function because they are both parts of a culture's system of technology.

Function

Lewis Binford (1965, 1973, 1986, 1989, and with S. Binford 1966), using the concept of functional variability, challenged Bordes' and later Sackett's stylistic argument. Functionalists perceive synchronic similarities and differences in stone tools as representing the function of the tool (Ammerman and Feldman 1974; Binford 1986 and 1989; Dunnell 1978; Mellars 1970). This method, however, was not deeply

ingrained into archaeological interpretation until the onset of processual archaeology. Early processualists strove to create a set of laws that accounted for cultural change, and they viewed human activities as repeating themselves in the same way over vast stretches of space and time.

When archaeologists emphasize function and exclude style, they stress that tool morphology is the result of human activity and adaptive reactions to different environments. The function of an artifact is the role the object played as an instrument of activity. For instance, the variation in the Mousterian stone tool assemblage was interpreted in terms of toolkit clusters with variations representing differences in the activity being performed or differences in the way people were using a site (Binford 1973). People manufactured artifacts and in turn used them in a succession of activities, which resulted in functional variation.

Differences in raw material availability and access, as well as procurement strategies are cited as a source for lithic variability in the archaeological record (Luedtke 1976; McAnnay 1988; Odell 1981; Rule 1983; Shott 1989; Tankersley 1990). Researchers traditionally contrast the direct access of resources by mobile people resulting in the curation of stone tools and the production of more formal tools, with an indirect procurement by sedentary peoples resulting in informal tools (Henry 1989; Parry and Kelley 1987). Other archaeologists propose that technology is affected by not only the availability of raw materials and mobility, but also the availability of raw materials in conjunction with the: 1) quality of the material (Andresky 1994) and 2) the nature of the social relations (Hayden 1990; McAnnay 1988). Andresky (1994) advocates that with direct access to high quality material

such as chert there is a tendency towards more formal tools which are resharpened and even given secondary uses, while poorer quality material tends to be used for less formal tools. Hayden (1990) suggests that environment in conjunction with social complexity is important for assessing scraper variability. Hayden argues that simple hunting/gathering societies in temperate or tropical climates have little social need for skin clothes and subsequently produce less formal scrapers made on locally available raw materials, and display poor or moderately developed usewear. In complex societies, garments become status-display items, resulting in economically based competition and the production of high-quality garments and other leather products. In these societies, one would predict the use of morphologically specialized hide-working tools made on carefully selected raw materials. The specialist would resharpen the tools many times, producing very pronounced evidence of use wear. Hide-workers would be selected specifically for the quality of their work, leading eventually to craft specialization and standardization in form. Yet, in other parts of the world, where complex societies produce specialized stone tools, researchers offer a slightly different scenario. They propose that a more standardized range of stone tools are found only for tools made for exchange, while stone tools produced for situational local use are less standardized (Arnold 1985; Cross 1990; Hughes 1990; Micheals 1989; Shafer and Hester 1983).

Reduction stages (i.e., use) are a common explanation for the source of functional variation in scraper morphology (Clark and Kurashina 1981; Dibble 1984, 1987; Kuhn 1992). People discarded scrapers during different stages of their use, which is responsible for the variation in their length, thickness, and extent of retouch.

Rule and Evans (1985:213-214) suggest Paleo-Indian people only manufactured scrapers on specialized "keeled" flakes to produce a steep and durable working edge. While Kuhn (1992) offers that raw material access and core reduction methods determine the shape of tool blanks and subsequently scraper form. The source and function of spurs or projections on the distal end of the scrapers is currently debated. Many believe that spurs protect the hand above the haft or that they are the result of transverse snaps of the tool that was then converted into a hafted graver (Rogers 1986; Rule and Evans 1986; Wilmsen 1968). Others argue that spurs are a fortuitous result of resharpening (Clark and Kurashina 1981; Nissen and Dittemore 1974).

In addition, archaeologists look to hafting to explain variations in the morphology of stone tools (Gould 1978; Keeley 1982). They associate lateral notching, crushing, thinning, and rounding of the proximal edge with the hafting of scrapers (Deacon and Deacon 1980:214; Hayden 1979:26-27; Keeley 1982; McNiven 1994; Rule and Evans 1985). Researchers also propose that polish and crushing of dorsal ridges, as well as organized striature indicate socketed hafting (Beyries 1988; Shott 1995). Researchers propose that hafted tools are more likely to be smaller, thinner, narrower, and with more retouch than expedient hand held tools (Deacon and Deacon 1980; Keeley 1980:50). In addition, Odell (1994) argues that increasing sedentism allowed for increased demand on resources inducing technological responses such as hafting, which in turn led people to economize with curation and standardization in stone tool form.

Experimental researchers determined to explain scraper variation through differences in associated activities have focused on type of raw material and

resharpening frequency (Brink 1978:97; Broadbent and Knutsson 1975), edge angle (Broadbent and Knutsson 1975; Wilmsen 1968), and edge wear and type of material scraped (Bamforth 1986; Hayden 1987; Hurcombe 1992; Keeley 1980; Shea 1987; Siegel 1984; Vaughan 1985). Central to the growing concentration of microwear studies is the debate over the chosen variables of analysis including abrasions, striations, scar definition, scar size, scar distribution, rounding, polishing, linear trends, crushing, shattering, frequency of microfracturing, and size of use fractures for delineating specific behavioral events. The uselife history of a tool may involve not only employment of the tool but also lateral recycling, curation, resharpening, and secondary recycling/reuse (Schiffer 1972, 1982). Distinguishing attributes that delineate the number of times a particular tool has been used, when it was used, and modifications to the tool during use provides potential insights into the importance and frequency of specific behavioral tasks (Shott 1995). For instances, stone tools may have greater use at some seasons of the year than others, they may be curated or manufactured in anticipation of use and transported between manufacture and use, or they may be recycled to undertake a different technological role.

Ethnoarchaeological studies of stone tools have contributed largely to the functionalist perspective including studies in North America (Albright 1984; Pokotylo and Hanks 1989), Mexico (Clark 1991), Australia (Binford 1986; Gould 1968, 1980; Gould et al.1971; Hayden 1977, 1979; Tindale 1965), South Africa (Webley 1990), and Ethiopia (Clark and Kurashina 1981; Gallagher 1974, 1977a, 1977b; Haaland 1987: 66-69, 138-141). Several of these studies provided descriptive accounts relating procurement, production, use, and discard patterns (Albright 1984; Allchin 1957;

Webley 1990). Others focused on particular issues such as the relationship between curation and resource availability (Pokotylo and Hanks 1989) and patterns of disposal and extent of sedentism (Clark 1991). Studies in Australia concentrated on the correlation between form, edge wear, and use (Binford 1986; Gould 1968; Gould et al. 1971; Hayden 1977, 1979; White, et al. 1977; White and Thomas 1972). For example, Binford (1986) studied the Alyawara of Australia process of making stone knives, in which each worker would carry the manufacturing process several steps and pass it on. Binford (1986) argued that the process by which the knives are made eliminates the ascription of stylistic significance:

> if members of a single social group produce formal variable assemblages of archaeological remains deposited at different locations, how can we use described differences among assemblages as unambiguous measures of differences in ethnic identity. (557-558)

However, Binford did not compare knife forms between ethnic groups and so has no basis for determining ethnic representation in tool form. One of Hayden's (1979) goals was to study differences between technologies in Australia's Western Desert, comparing groups further south to those already studied in the north. Unfortunately, resettlement made original homeland association difficult to assess, and furthermore many of the individuals had not worked stone for 25-30 years. White and Thomas (1972) and White et al. (1977) briefly studied the concept of mental templates and stone tools among the Duna of Papua New Guinea. They compared the typologies of men from different parishes (political units) and determined that they used similar materials for similar functions, which created stone tool similarities. However, they also noted differences in tool form based on individual personality characteristics (e.g., larger men made larger tools). Hence, previous ethnoarchaeological studies of stone

tools clearly have contributed to a better understanding of stone tool distribution patterns, use, and production sequence, but provided little toward our understanding of style.

The dichotomy between stylists and functionalists is a current and important ongoing debate in archaeology (Binford 1986, 1989; Chase 1991; Sackett 1989, 1990; Wiessner 1989, 1990). Ethnoarchaeologists concerned with the meaning behind stone tool variability primarily enter their research with the intent of studying function. My ethnoarchaeological study of the stone scrapers of the Gamo hide-workers serves as an avenue for testing hypotheses about prehistoric social patterns and for the understanding of symbolic and utilitarian technologies.

Previous Research of Ethiopian Hide-Workers

The tremendous variation of stone scraper forms, despite their seemingly similar function, in southern Ethiopia provides a unique situation for exploring the relationship between stone tool style and function through ethnoarchaeology.

Descriptive Accounts

The historical record recounts the presence of hide-working as early as the mid-eighteenth to nineteenth centuries in northern and central Ethiopia (Figure 1-2), in the regions of Shoa (Bartlett 1934:92; Insenberg and Krapf 1843:255-256; Merab 1929 Johnston 1972 [1844]), Tigray (Bruce 1790; Combes and Tamisier 1838:77-79; Lefebvre 1846:240-243), Gondar (Wylde 1888:289-291), and Harar (Burton 1894:170; Paulitschke 1888:311; Rey 1877:225). However, it was not until Johnston

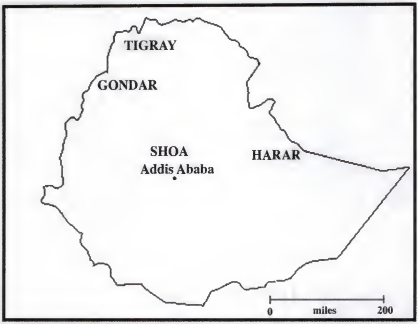


Figure 1-2: Map locating the historically documented regions practicing hide-working in northern Ethiopia.

(1972 [1844]:370-374) stayed in Shoa between 1841-1844 that we are provided with the first written account of stone tools associated with hide-working. Johnston stated that the hair and fat on a hide was removed by a rough stone. Giglioli (1889) published the first detailed description of the use of stone tools for hide-working in Ethiopia. He stated that the presence of stone tool use in Africa was rare, but that the Oromo and Gurage peoples of Ethiopia made and used obsidian scrapers for hide-working (Figure 1-3). The obsidian scrapers were inserted into either side of a wooden handle and fastened with resin (Giglioli 1889). This early article provides the first illustration of the handle and stone tools and demonstrates the historical depth of stone tool use for hide-scraping in Ethiopia.

The presence of hide-working with stone tools in southern Ethiopia (Figure 1-3) later was reported and more specifically illustrated by German ethnographers studying the Dizi, Sidama, Gugi, and Gamo (Haberland 1981, 1993:94; Straube 1963:22 plate.13) (Figure 1-3). Haberland (1981, 1993) reported that among the Dizi, the hide-workers use an obsidian blade that is fixed into the hollow of a wood-piece with dark-bees wax. The descriptions of the hide-working process in these texts are minimal but the illustrations demonstrate that there are a variety of handle forms produced by different ethnic groups.

Systematic Studies

Gallagher (1974, 1977a, 1977b) conducted the first systematic study on stone tool production and use among the Ethiopian hide-workers. The focus of the study was to determine if the modern hide processing workshops resembled two Later Stone

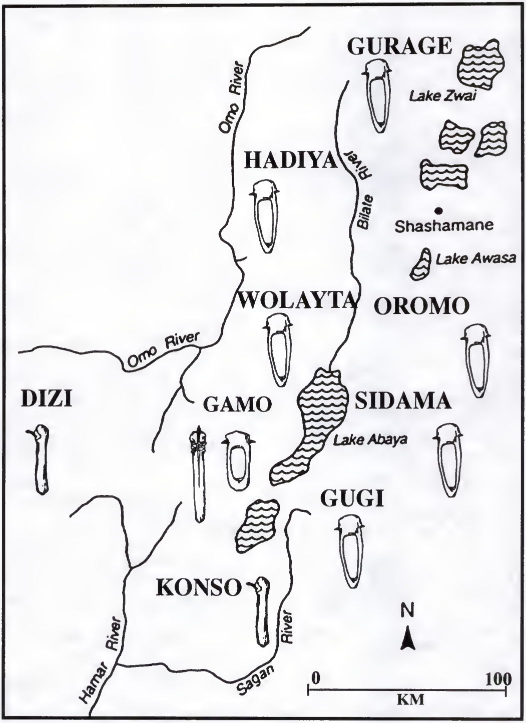


Figure 1-3: Map of current ethnic groups with stone-tool using hide-workers in southern Ethiopia.

Age sites in the Gurage area of central Ethiopia. He concluded that there were no similarities between the types and distribution of stone tools and debitage in the ethnographic and archaeological record. His initial observation of stone scraper production and use was with two Gurage hide-workers of Dalacha, who use iron scrapers but in the past had used stone (Gallagher 1974). He (1977a, 1977b:214-311) later spent two months studying seven Gurage (in Dange-Lasho and Mafaed), three Wolayta/"Sidamo" (in Debo), and two Oromo hide-workers (in Dincho and Sire) (Figure 1-3). Gallagher (1977b) compared scrapers he collected from Gurage, Oromo, and Wolayta dumping pits and emphatically concluded:

> There is a very low degree of variability from individual to individual in terms of the manufacture and style of the stone tools and the process of their use. This is remarkable in that the artifacts are from three separate ethnic groups. (412)

Gallagher concluded that there were no statistically significant differences in the frequency distribution of the debitage types and scrapers or in the metric dimensions of the scrapers and debitage between different ethnic groups.

Clark and Kurashina (1981) subsequently studied an Oromo hide-worker from the Bale area of southeastern Ethiopia (Figure 1-3). They compared 30 used scrapers to 14 unused scrapers to determine traces of the behavioral patterns of use. Microscopic analysis enabled them to identify striations on the ventral side of used and discarded scrapers in a crisscross pattern, which reflect the rotating of the working edge during scraping. Most notably, they quantified a significant difference between the average working edge angle between unused (44 degrees) and used (57 degrees) hide scrapers. Furthermore, they demonstrated a size difference in the length of unused and used scrapers. Lastly, they plotted the distribution of obsidian within and

around a household, determining that there were virtually no lithics found in the living activity areas (workshop and household). Importantly, they demonstrated that archaeologists could easily misidentify midden deposits as activity areas, instead of locations of secondary discard.

Haaland (1987:66-69, 138-141) studied a Wolayta (Figure 1-3) hide-worker in Soddo of southern Ethiopia. She compared the microwear edge damage and discard distribution of ethnographic obsidian to Neolithic rhyolite and basalt scrapers from Sudan. She noted the presence of crushing and microscarring on the working edge on both the ethnographic and archaeological scrapers. From this study, she ascribed hide-working activities to the Neolithic assemblages.

In all these studies of the Gurage, Oromo, and Wolayta hide-workers (Gallagher 1974, 1977a, 1977b:214-311; Clark and Kurashina 1981; Haaland 1987:66-69), the researchers reported the same basic pattern of tool manufacture, use, discard, style, and function, summarized as follows. The exclusively male hide-worker acquires obsidian (reportedly the only stone raw material used, although glass was also used) from either a middleman in the form of "roughed out blanks" or directly from one or more quarries. The manufacture of the scrapers occurs either within the artisan's house or directly adjacent to it. The hide-worker uses direct percussion, with an iron bar or ax as a hammer, to strike flakes from a core. The manufacture of the tools occurs over a leather skin laid on the ground, a basket, or a wooden bowl. The hide-worker or his wife collects the debitage and throws it into a pit or specific trash area located behind the house or outside the compound. The flakes are made into a single tool type: unifacial convex end scrapers. One scraper is selected and inserted

into a carved-out socket on the right side of a two-sided wooden handle. Another scraper is inserted on the left side. The scrapers are secured in the haft with resin. The hide to be scraped is stretched out on a vertical wooden frame situated outside the house but inside the compound. Holding the handle with both hands and with one scraper-socketed side against the softened hide, the hide-worker scrapes off long shavings of the skin from the fatty, inner side of the hide. Periodically the hide-worker resharpens the end of the scraper with an iron hammerstone, and/or turns the handle to the other scraper-mounted side and continues scraping. Clark and Kurashina (1981:306) estimate that the hide-scraping process takes 8-10 hours, by which time both mounted scrapers are worn out. Gallagher (1977a:411) and Haaland (1987:69) indicate that the process takes six hours in which time four scrapers are exhausted.

These studies of the hide-workers report little if any variability in the hide-working processes, especially in the shape or size of the handle nor the general shape of the scrapers. The researchers clearly took a functionalist perspective, contributing to our knowledge of procurement, production, use, discard, and edge-wear. However, there was little emphasis on reconstructing the social organization or history of the hide-workers and only one attempt (with a very small sample size) to determine aspects of style by considering variation among and between different ethnic groups.

1992 and 1995 Reconnaissance

In January and February of 1992, during a reconnaissance of southern Ethiopia in search of evidence for the origin and evolution of enset (*Ensete ventricosum*) food production, Steven Brandt briefly visited the Gamo, Wolayta, and Konso peoples

(Figure 1-3). Brandt observed the continued use of stone tools among these people for scraping hides.

During May and June of 1995, I accompanied Dr. Brandt to Ethiopia to conduct an intensive survey of hide-workers in southern Ethiopia. A Wenner-Gren grant supported this study to gain a better understanding of the geographical and ethnic distributions of hide-working in preparation for future in-depth studies. This project confirmed the continued use of stone tools for hide-working among the Gamo, Gurage, Hadiya, Konso, Sidama, and Wolayta peoples (Brandt 1996; Brandt et al. 1996; Brandt and Weedman 1997) (Figure 1-3). It also revealed a great diversity in hide-working practices concerning handle and scraper form, gender, and technology.

Previous studies of the hide-workers indicated the use of one handle type with two scrapers secured with mastic into sockets on either side of the handle. We discerned the use of three different handle types (see illustrations on Figure 1-3) in southern Ethiopia: 1) double-hafted mastic handles among the Cushitic Sidama, Cushitic Hadiya, Ethio-Semitic Gurage, Omotic Wolayta, and the Omotic Gamo; 2) single-hafted mastic handles used among the Cushitic Konso; and 3) single-hafted nonmastic handles used by the Omotic Gamo (Brandt 1996; Brandt et al. 1996). We also discovered that the hide-workers used other types of stone materials besides obsidian. The Gamo use chert scrapers and the Konso use quartz scrapers. Unlike earlier studies in which men exclusively worked as hide-workers, it was clear that among the Konso and Wolayta, women independently manufactured and used stone tools for hide-working. In addition, the Konso hide-workers used completely different techniques for tool manufacture. Using a large round stone as her hammer, the hide-

worker uses the bipolar technique (rather than direct percussion) to break locally available quartz pebbles against a flat stone. She selects small flakes and through direct percussion shapes them into small narrow-nosed end scrapers. Finally, we also recorded differences in the deposition of debitage. The Gamo allowed debitage waste and retouch to remain on the ground where it fell during use, while the Konso collected these materials and dumped them outside the village.

An examination of the handle, socket, and scraper morphological measurements reflected the geographical relationship between the six ethnic groups, especially when viewing the relationship between the unused scrapers (Brandt et al. 1996). The length of the scrapers compared between ethnic groups also indicates the importance of material type, such that shorter scrapers were made of chert and longer ones of obsidian (Brandt and Weedman 2000). Hence, hide-working material culture suggests that although each ethnic group uses material culture to maintain their own social identity, available material resources also may influence scraper morphology. Shared historical processes, in terms of conquest by northern twelfth to sixteenth century feudalistic societies of southern Ethiopia, may account for similarities and differences expressed by the material culture associated with southern Ethiopian hide-working practices and material culture. However, more detailed ethnographic, oral history, and archaeological studies of crafts people from individual ethnic groups needs to be conducted before we can more definitely describe their origins and explain the process of their social position within Ethiopian societies.

Research Hypotheses

This study is the first since the 1996 survey to concentrate on southern Ethiopia hide-working with stone tools. I selected the Gamo hide-workers as the focus of my research concerning the role of group membership (style) and environment (function) in material culture because of the great variability I witnessed in their hide processing practices and material culture. As discovered in the 1995 survey, the Gamo are unique in southern Ethiopia for their use of two different handle types, the *zucano* (double-hafted mastic handle) and the *tutuma* (single-hafted nonmastic handle) (see Figure 1-3), which seemingly are used for the exact same function, i.e., to scrape cattle hides for bedding. The use of two handle types within a single ethnic group indicates that there are a variety of methods used for achieving the same ends. This study of the Gamo hide-workers offers tremendous potential for exploring intracultural rules that govern technological strategies and provides an excellent opportunity to test multiple hypotheses concerning the nature of similarities and differences in stone tools.

I test the hypothesis that the function of a stone tool rather than style accounts for most of the synchronic variability. In this scenario, the formal variation in Gamo scrapers should have no significant variation among hide-workers who engage in the same hide-working process. The variation in the scrapers will only differ when there are differences in activity such as the use of different types of raw material for scraping (chert and obsidian), differences in distance to resources, scraping a different type of hide (highland and lowland cattle hides), the scraping of a hide for different products (bedding verses saddle), the length of a scraper's uselife (1 or more hides),

and the use of scrapers for different types of scraping activities (shaving verses chopping).

I also test whether style accounts for the variability witnessed in the synchronic appearance of stone tools that are functionally similar. There are a variety of ways to produce an object that will serve the same function. The selection of an object and its form is a matter of choice, determined ultimately by learning in a social context. If this is true, there should be a statistically significant correlation between Gamo group membership (lineage, clan, political district, and ethnicity) and geographical location and the similarities and differences in stone tools and their handle/haft type.

In addition, I will determine if Gamo stone tools represent iconic or isochrestic style. Iconic style represents a conscious active effort on the part of the maker to represent his/her social identity (iconological or emblemic style). In contrast, with isochrestic style the identity message of a stone tool may be actively interpreted even if it is unconsciously manufactured. If style is iconic in Gamo scrapers, then the hide-workers should be able to sort an assemblage of modern Gamo scrapers and identify their own scrapers, those belonging to other members of their social groupings, and identify those that are different. Gamo hide-workers should also have a conscious mental template of what their scrapers will look like with the intention of making them different from hide-workers in other social groups, in order to present self or group identity. However, if style is isochrestic, the Gamo hide-workers should not have a conscious mental template of what their scrapers will look like nor will they intentionally make them different from hide-workers in other social groups. They may attribute the morphology of the scraper to tradition, to the way their ancestors made

them, or to fitting into a specific haft. Each Gamo hide-worker should only be able to discern scrapers that are different and belong to individuals who belong to other social groups.

Finally, I test if the attributes of style are distinct and separate from attributes of function. In assigning their emic typologies to the scrapers, hide-workers should be able to assign independent attributes to the tools, which indicate either social identity or function. An attribute analysis of the tools also should demonstrate a statistically significant correlation between specific attributes of the tool that vary independently with either social or functional context.

Premise

This research project is a necessary step in understanding ubiquitous materials in the archaeological record, stone tools. The Gamo hide-workers are one of the few peoples to continue to make and use stone tools. They live in a diverse geographical (highland and lowland) and social environment (both intra and interethnic relationships), which is potentially reflected in their practices relating to stone tools. Hence, they provide a rich context for interpreting how group membership (style) and function are related to similarities and differences in the morphology of stone tools. Exploring the functional and stylistic elements of the meanings of stone artifacts among people who produce and use them today has the potential to reveal the harmony and tension in past societies and a better understanding of past social systems.

My two-year ethnoarchaeological study of the Gamo hide-workers revealed that the local environment and available resources for stone tool production in association with their makers' social identities interfaced with geographic and cultural divisions in the landscape. The following chapters will demonstrate that by exploring similarities and differences in terms of scales of analysis eliminates the necessity for a function and style division and emphasizes that because culture is heterogeneous both aspects exist within the material culture of a single ethnic group. Chapter 2 outlines my theoretical and methodological approaches to determining the origin of variation in the Gamo stone scrapers. Chapter 3 provides a description of Gamo culture and the social, economic, and political position of hide-workers. Chapter 4 describes the Gamo hide-working practices and access to resources at the regional/ethnic group scale within the western highland-lowland region of Lake Abaya and Chamo. It examines the Gamo hide-working process and the subsequent functional scraper variation that might arise as the result of differences in activities related to access to resources. The subsequent chapters explore scraper variation in terms of style and its association with Gamo political and social relationships. Chapter 5 compares the Gamo hide-working practices and materials with other southern Ethiopian ethnic groups, especially Omotic groups. It also analyzes Gamo hide-working materials and practices on an intracultural macroscale in terms of subregions (north, central, and south) and districts (*deres*). Chapter 6 demonstrates the reflection of moiety, clan, and lineage membership in scraper morphology and the distribution between village (*guta*) contexts. Chapter 7 illustrates the expression of domestic groups, age, experience, handedness, and individuality in scraper morphology and scraper

intravillage and household distributions. Lastly, Chapter 8 summarizes the results and provides an outline for future directions in the ethnoarchaeological studies of stone tools.

CHAPTER 2
WHITE WASHING CULTURAL STAINS: RESOLUTION THROUGH ETHNOARCHAEOLOGICAL METHODS

In the last chapter, I discussed Olmstead's (1997) description of southern Ethiopian cultures as watercolors, where the cultural colors fade into one another and even make new colors. It is has taken a long time for archaeologists to discover the heterogeneous nature of culture--to avoid white washing a culture's great variety of colors into one homogeneously defined unit through material similarities. One method that can extradite archaeologists from the concept of a monothetic culture is ethnoarchaeology. Ethnoarchaeology has the potential to expose us to other voices and provide a starting point for trying to understand alternative inferences concerning material culture. Hence, this ethnoarchaeological study of the Gamo hide-workers concentrates on an emic understanding of social, economic, and political relationships and how they are reflected in the morphology and distribution of stone scrapers across the landscape.

Ethnoarchaeology: History, Theory, and Stone Tools

Most archaeologists interpret variation in stone tool assemblages through either inference or experiment (Crabtree 1975; Frison 1989; Ingersoll, Yellen and MacDonald 1977; Young and Bonnichsen 1985). However, the use of these methodologies brings into question the validity of our own ethnocentric

interpretations of the past. Ethnoarchaeology offers us the opportunity to shed preconceived notions and ideological constraints that lock us in ethnocentric interpretations of the past. The danger in using ethnoarchaeology is for the archaeologist to apply blindly the present on the past and in the process deny both the ethnographic study group and the prehistoric people their individual histories. The interpretation of the past has always been based on our understanding of present societies. The use of inference as the mainstay of archaeological reasoning is examined in its historical context as it transforms from under the guise of speculation to science. Subsequently, I discuss how our inferential methodology has affected those whose prehistory and history we study, and the interpretations we make about them.

Speculation and Ambivalence

During the colonial era, westerners began recording the presence of stone tool production and use in the Americas, Australia, and Africa (Aiston 1929, 1930; Dale 1870; Dunn 1879-80; Hahn 1870; Hambly 1936:49; Giglioli 1889; Mossop 1935:179; Mountford 1941; Murdoch 1988 (1892):294-301; E. Nelson 1899:112-118; N. Nelson 1916; Roth 1899:145-152; Spencer and Gillen 1927:536-550). Since the day when objects were recognized as products of past human activities, we have been engaged in a process of analogy. The choice of using the pronoun "we" is crucial for it puts into context the cradling and nurturing of the discipline of archaeology within the western world (Orme 1981:2-16; Robertshaw 1990; Trigger 1989). The earliest framework for understanding ancient objects is often referred to as the Speculative

Period because it involved the interpretation of archaeological material culture through speculation. Initially the western world believed that stone tools were the result of supernatural origins such as thunderbolts and elves (Heizer 1962:63). However, subsequent colonial expansion in the sixteenth and seventeenth centuries exposed Europe to knowledge of cultures outside its own domain. Ancient objects were recognized as evidence of past cultures based on their similarities with the material culture of other cultures, who were thought to have lost their "technology and civilized ways" because they did not follow Christianity (Trigger 1989:52). In the sixteenth century, Pietro Martire d'Anghiera first raised the possibility that in the past European people had used stone tools and did not know how to use metal (Hodgen 1964:371).

Despite the growing realization concerning the prehistory and changes in European society, speculations about the past in Africa, Asia, and the Americas rendered them stagnant societies. During the height of western European exploration and colonization, there was a reluctance to attribute native peoples with archaeological sites. Antiquarians believed that European, Near Eastern people, and lost tribes such as the Moundbuilders stimulated the development of the earliest civilizations in the colonies (Atwater 1920; Bent 1893; Frobenius 1913; Hall 1905; Morgan 1876; Priest 1833; Stow 1905). Antiquarians used European stone tool terminology to describe African stone tools, and they claimed a movement of tool form and function from the north (Europe) to the south (Africa) (Dale 1870; Gooch 1881). By concentrating on stone tool studies across the continent, antiquarians promoted the European ideology of a backward and "primitive" Africa that

represented a living example of Europe's past (Trigger 1989:52). The Americas were simply denied any evidence of a Paleolithic culture and the stone tools present in early deposits were associated with either foreigners or were considered misstratified and belonging to early Native Americans (Holmes 1914; Thomas 1898). This ensured not only a stagnant past for the Americas but also portrayed Native Americans in an unfavorable light as primitive and biologically inferior.

Unlike in Africa and Asia, where colonies were still dominated by indigenous people, by the late nineteenth century the Native American populations had dwindled to the extent that colonialists no longer felt threatened. This probably led to earlier recognition concerning their relationships to archaeological finds of complex societies. In the late nineteenth and early twentieth centuries, American archaeologists began to associate Native Americans with significant and complex archaeological finds. Jesse Walter Fewkes (1900:579) was the first to use the term "ethno-archaeologist" in his study of Hopi Pueblos. Fewkes stated (1900),

> The main types of pueblo ruins have been described, and what is now necessary is a study of the manners and customs of the people who once inhabited them. This work implies an intimate knowledge of the ethnology of the survivors, and a determination of the survivor's identity may be had from migration legends of clans now living in the pueblos. ... There remains much material on the migrations of Hopi clans yet to be gathered, and the identification by archeologic methods of many sites of ancient habitations is yet to be made. This work, however, can best be done under guidance of the Indians by an ethno-archaeologist, who can bring as a preparation for his work an intimate knowledge of the present life of the Hopi villagers. (578-589)

Although he and other archeologists such as Cushing (1886) allowed for a connection between prehistoric and modern populations of Native Americans, they also maintained the idea that change had been minimal and hence, ethnoarchaeology was deemed an appropriate source of inference.

By the late nineteenth and early twentieth centuries, many studies of present day societies, who still used stone tools, were correlated directly with archaeological remains (Allchin 1957; Elkin 1948; Murdoch 1892:294-301; Nelson 1899:112-118; Stow 1905:62). Archaeological interpretation reached a crux in which analogy was indispensable and yet methodologically unsound because of its speculative nature. Kluckholm (1939) chastised archaeologists for their failure to examine the assumptions that underlie their methodologies.

> Our techniques of observing and recording are admittedly still susceptible of improvement, but they seem much further advanced than our development of symbols (verbal and otherwise) by which we could communicate to each other (without loss or inflation of content) the signs and symptoms we observe. (338)

Thompson (1956) felt that archaeological inferences were inherently subjective on two accounts: 1) in formulating the hypothesis and 2) in the selection of ethnographic analogs. I would add that typological inference of this period seldom considered formation processes, failed to explain how two different archaeologists could produce different typologies for the same material, and failed to regard the complicating features of culture which make them unique and discernible from one another. Ascher (1961) suggested that to rectify the problems archaeologists should use ethnographic comparison only where actual historical ties existed. The danger with the direct historical approach is that it is like uniformitarianism, as the researcher forgets the differences and neglects to account for the similarities. J. G. D. Clark (1953) added that we must tie historical connections with ecological-economic similarities because history may contain great changes that profoundly alter the economy of the descendant's culture. Hawkes (1954) suggested that there is a ladder

of inference indicating that the natural science basis for the reconstruction of technology is a more reliable inference than those related to the economic, subsistence, political, and social spheres. Wylie (1985) deemed this era "Chronic Ambivalence" because archaeologists drew a line forcing themselves to choose between faulty methodology (analogy) or no methodology at all.

Science

Beginning in the 1960s, ethnoarchaeological studies correlated differences and similarities in stone tools with the tasks they perform and/or their stage of use in the life cycle (Albright 1984:50-59; Binford 1986; Clark and Kurashina 1981; Gallagher 1974, 1977a, 1977b: 224-299; Gould 1968, 1977; Gould et al. 1971; Hayden 1977; Nissen and Dittemore 1974; Tindale 1965). Processual archaeologists of the time were dedicated to positivism and enacting proper scientific research programs, which was assumed to eliminate any speculation concerning reconstructions of the past. In the search to create cross-cultural laws, that would span time and space, the focus was on how humans adapt to their environment. At this same time, however, Binford (1962) insisted on an archaeology that was based in anthropology because both were "striving to explicate and explain the total range of physical and cultural similarities and differences characteristic of the entire spatial-temporal span of man's existence" (217). He rejected Hawkes (1954) concept of an inferential ladder, but believed that all aspects of the past are equally accessible. In his search for the dynamic, he turned to ethnographic and actualistic studies of modern material culture (Binford 1967, 1978, 1981, 1989). He argued that archaeologists should use analogical considerations

to formulate a hypothesis, but not to consider them in the evaluative interpretive conclusions, when tested and placed in the archaeological context (Binford 1967). This is dangerous, because Binford did not consider the contextual (spatial and temporal) differences and similarities between his ethnoarchaeology and archaeological data, which may raise new insights for changes across time and space.

For Binford, culture is a complex system that consists of the interaction between people and the environment that cannot be relegated only to ideas. Only functional variability straddles between people and their environment and only a functionalist perspective can use a scientific approach and adequately deal with the explanation of cultural process (Binford 1965). Gould (1980:32-33, 1990:26-29) objected to Binford's generalized laws of culture, because he believed they lacked explanation of how or why there are correlations through time. This is why he stated that humans are constrained by the natural environment (which provides the answers of how and why for correlations) and in turn have certain determinate adaptive options open to them in given environments (Gould 1980:48-53). Gould stated that anomalies are the tools used for discovering behavioral relationships and are due to culture or ideational aspects that are inaccessible through general laws. However, Watson (Gould and Watson 1982) pointed out that Gould has more in common with Binford than he would like to admit simply because both use analogy to generate hypothesis about uniformities that may hold over time and across culture. Watson (Gould and Watson 1982) argued that uniformitarianism denies the presence of site formation and the restrictions of archaeological sampling in its reconstruction of the

past. Despite the rhetoric of an anthropological archaeology, processual archaeologists such as Binford and Gould ignored social and historical context.

The concept that science is the means through which archaeologists infer information about the past is now deeply embedded in the discipline. New archaeology ironically neglected context and it neglected history while at the same time trying to recover it. The science of archaeology has been criticized within the discipline by post-processual archaeologists for its inability to take on a worldview and to recognize its limitations for understanding human culture, which is not natural and thus not applicable to the natural science approach and as such ignores the inner factors of human behavior (Gardin 1992). Science is embedded in an ideology that is alienating because it advocates the presence of objectivity and one truth, when in fact truth is ideologically informed (Hodder 1989, 1991; Schmidt and Patterson 1995; Tilley 1993; Wylie 1993).

Contextualized Studies

An alternative to the processualist's view of ethnoarchaeology can be found in a contextual approach to ethnoarchaeology. The basis for the contextual interpretations of materials originated in the work of Taylor (1948). His insightfulness labeled the work of his contemporaries as comparative or taxonomic because it tended to describe archaeological data in simple reference to ethnographic data. Taylor (1948) emphasized the importance of context:

> therefore, what is necessary is that we compare not individual items either separately or in groups, but rather cultural contexts and/or broad cultural complexes as wholes. But when items are taken in conjunction with, and in relation to their cultural matrix, they may be expected and indeed are found, to

> show differences that are locally and comparatively significant. A determination of the meaning of these differences is not always possible, immediately or ultimately, but this is no reason for their neglect. (169)

In essence, he believed archaeologists of his era tended to compare two cultural entities to each other whose relationships lay outside one another and thus was devoid of context. Taylor (1948:171) advocated that archaeologists should look at ethnographic information as a model from which to draw ideas about the types of questions we ask of the material remains, and in the construction of an ethnography of the past. Although more recent theory points to the importance of contexts, unfortunately Taylor's work was largely shunned at the time because it so heavily criticized several leading archaeologists.

Archaeologists who have attempted to take a conjunctive approach examining history and context and incorporating human ideas are accused of pure speculation (Binford 1962; Dunnell 1978; Leach 1973). Ironically, it is this context that functionalists ignore, which allows ethnoarchaeology to be scientific rather than speculative (Taylor 1948; Wylie 1982). The context of the material remains provides the background knowledge for informed plausible explanations. Scientific knowledge is not limited to observable data and furthermore the theoretical context color the facts (Wylie 1982, 1985). Contextual models are not speculative because they are constrained by the material record left by the past and because we base plausible explanations on informed analysis of how they could have been generated. Giddens (1979:242-245) similarly stated that all laws operate within a boundary and that we can only rationalize action in its context, as history dictates. Archaeologists test the relationships they posit through a variety of mediums/contexts including the

ethnographic present, historic documents, oral history, and archaeological material culture (Schmidt 1983, 1997:27-28). If we examine the differences as well as the similarities in different contexts (social, environmental, space, object, and text), it will have the effect of expanding rather than reducing culture and people to a set of unchanging rules (Hodder 1982:217-220).

By focusing on a contextual study of the past and present, we avoid the inherent contradiction of creating ladders to reach closer to the perfect analogy. As Wylie (1982) states, "an analogy is by its nature a similarity between things that are unalike in other respects, a perfect analogy is a contradiction in terms" (395). If there were no dissimilarities, then we would have identity rather than analogy. Since change is a constant factor in society, the differences are as important as the similarities when we are comparing aspects of culture through time and across space (Schmidt 1985; Wylie 1985). The use of universal laws displaces the variability in material phenomena (Murray and Walker 1988). The differences or the anomalies are just as important because they identify the process of culture change.

Furthermore, by ignoring context, Schmidt (1985, 1997:28-30) points out that archaeologists are actually engaged in metonymy because they mix past and present domains. Metonymy differs from analogy, such that in analogy two separate domains share some (not all) similar attributes, but in metonymy there is the actual mixing of domains so that one object is referred to as another. Archaeologists use artifacts (parts) to understand past culture (whole), we ascribe names to the artifacts that imply an unspoken meaning such as scraper or point, and we describe the past as we see it in the present (mixing two separate domains). This transformation has occurred not

only with respect to how we understand the past, but how we represent ourselves within our discipline and towards others.

The terms and phrases we ascribe to material culture are contextualized within a current understanding of materials and technologies of societies in the present world. Schmidt (1985) offers that not only have we transformed the past through our own choices of inference, but that we have misnamed it analogy to mask its real power. Orme (1981:11-13) argues that by the 18th century, Europeans equated prehistoric with modern "primitive" societies. When coupled with evolutionary paradigms, archaeological interpretations relegate the social positions of people outside the western world as inferior. Similar explanations are recurrent in today's discussions of nonwestern peoples, such as Lee's (1979:1-2) description of Inuit, Australian, and Kalahari hunting and gathering peoples, which strips them of history by focusing only on their environmental adaptations and functional aspects of their material culture. The trajectory of archaeological reasoning must not only be viewed in terms of how we transform the past from present knowledge and past material culture, but how we also affect the present with our interpretations. Wilmsen (1989) proclaimed that "ethnographic practice thus provides empirical support for the theoretical justification of ideologies that tolerate, while claiming not to advocate segregation of that 'other' world" (xiii). Archaeologists do no less when they speak about the past. The words and symbols we choose reflect symboling and the ritual justification of power over the other (Schmidt 1985). How we construct history and prehistory goes beyond misnaming metonymy as analogy, it demonstrates an ability in ourselves to cover up the issue of how we construct and transform speculation into

science and the bipolarity found within the latter (Schmidt 1985). A view of the past through the eyes of others is something that is just beginning to foster an interest in our discipline.

A contextual approach to ethnoarchaeology allows us to explore the ideologies of living populations and how they invoke meaning into materials. It helps us to focus on both the similarities and differences in time and space, which ultimately explain the variations we see in archaeological materials. Ultimately it will lead us to better understanding of the environmental and cultural factors that affect material culture.

A Scales of Analysis: Cultures as Heterogeneous and Polythetic

In the past most archaeologists tended to view culture as homogenous and bounded (Brew 1946; Kreiger 1944; Rouse 1954). In addition, even later processual functionalists bounded cultural activities based on their environmental determinism (Binford 1968; Jochim 1976; Steward 1955). Jones (1997:1-6) attributes this blindness to the heterogeneous nature of culture to the politics embedded in archaeology. As discussed earlier, the birth of archaeology rests in a European context. Artifact types were used first to identify cultures and distinguish ethnic groups to support ideas of the superiority of Aryan Germanic super-race (Jones 1997:1-6). Archaeology has its roots in western European ideology which covets otherness in attempts to not only segregate nonEuropeans from Europeans, but to bolster and maintain national identities within Europe. This meant that culture and

ethnicity had to be bound and separated from external influences, i.e., the overlapping and internal differences were whitewashed.

With the changing political atmosphere in the 1960s, anthropologists began to more widely challenge the ideas of cultural boundaries and recognize the idea that within a culture there exists a variety of identities (Barth 1969; Fortes 1969; Leach, 1964; Wilson and Wilson 1954). In the American Southwest, a debate began which surrounded the meaning behind archaeological typology, particularly ceramics (Ford and Steward 1954). Several of these researchers recognized that variations in ceramic assemblages traditionally associated with a culture might represent intracultural social groups. Gifford (1960) and Deetz (1967) in particular, concluded that attributes represent individual or site specific characteristics, varieties represent small social groups or subbranch area variation, types represent regional varieties or the patterns and value orientation held by the majority of a culture, and complexes represent broad cultural areas. In Europe, the work of Clarke (1968, 1972) also recognized the polythetic nature of culture and artifacts. He (Clarke 1968:366) applied a different scale of analysis recognizing site assemblage (family), subculture (group of families), culture (tribe), culture group (cluster of tribes), and technocomplex (as tribal confederation/nation). However, despite these early contributions, archaeology has been slow to recognize cultural heterogeneity (Hodder 1982; Jones 1996; Shennan 1989). Recently, Jones (1996) stated:

> at one extreme there may be a high degree of homology between the structuring principles of the habitus and the signification of ethnicity and other identities in both material and non-material culture...however, there may also be a dislocation of such homologous relationships to the extent that the generation and expression of a common identity incorporates a bricolage of

> different cultural traditions characterized by heterogeneous structuring principles in many social domains. (71-72)

Material culture is produced, used, and discarded within social practices and social structures (Bourdieu 1977:76; Jones 1996:117). Anthropologists long ago recognized that the range of interdependence between members depends on the intensity of communication, which varies geographically and historically (Wilson and Wilson 1954:25-30). Moreover, the similarities and differences in material form are generated, maintained, and transmitted depending on the degree of intercommunication between members of a population (Clarke 1968:364). In most societies, the highest degree of genetic and cultural communication occurs at the domestic group level. With the domestic group as the basic unit, Clarke views intercommunication in an increasingly wider framework to include groups of families, tribes, tribal groups, and confederations/nations. However, others have pointed out that trade, gift exchange, warfare, and other forms of intercultural communication can alter distribution patterns of the material world (Hodder and Orton 1976:55-73; Hodder 1977). Analyzing material remains in terms of significant social scales of analysis can provide us with a rich understanding of past social and economic structures (Clarke 1968; Hodder 1982; Jones 1996).

Field Methodology

Regional Survey

To access an understanding of variation in Gamo stone tools, I enlisted a contextualized scale of analysis study. Hence, I studied the stone scrapers in terms of

their position in the environmental and cultural landscape. My ethnoarchaeological study of the Gamo hide-workers consisted of three stages of research: 1) documentary and archival research in Addis Ababa (6 weeks); 2) an ethnographic survey of the Gamo villages to locate hide-workers (6 months); and 3) in-depth interviews with hide-workers within four villages. I spent the first six weeks reviewing historic and ethnographic texts related to the Gamo and hide-working at the library of the Institute of Ethiopian Studies at Addis Ababa University. This research allowed me to collect information on the Gamo and their neighboring ethnic groups, which is otherwise unpublished.

During my first six months among the Gamo, I studied the similarities and differences in their handles, sockets, and stone tools in terms of their location within the Gamo territory. I conducted an ethnographic survey of the Gamo hide-workers in order to: 1) survey the Gamo region to locate hide-workers, 2) record their social and geographical relationships, and 3) discover the types of handles and stone tools they were using.

I interviewed at least one hide-worker from each of the villages (i.e., that has hide-workers) in 6 of the 10 Gamo districts (*deres*) including Doko, Kogo, Dorze, Ochollo, Zada, and Borada. The total number of hide-workers living in six of the 10 districts is 550, which is an average of 92 hide-workers per district. Based on the latter calculation, there are probably at least 1000 Gamo hide-workers. The average number of individual hide-workers living in a village was three, with a range of 1 to 15. I interviewed the elder hide-worker of each lineage. Although most hide-workers did not know their age, I could estimate age by inquiring about political changes

which had occurred during their lifetime. The average age of the hide-workers I interviewed was 40-49, with a range from approximately 20 to 70 years. I chose the elders because hide-working is a dying occupation, as youths turn to other occupations. Elders also are more likely to continue to use stone, and they generally have a better knowledge of kinship relations and provide a good source for oral history. I also visited the districts (*deres*) of Ganta, Bonke, Kamba, and Dita, where I did less intensive surveys that involved visiting hide-workers who lived near the road and interviewing them in markets. During the survey, I interviewed 180 hide-workers living in 115 villages

I obtained preliminary information concerning the type of handle and scraper raw material used (iron, glass, chert, and obsidian). I had the hide-workers relate to me the history of their material culture, such as how and from whom they learned hide-working and stone tool production, explanations for changes in material culture, and why they used specific forms or types of raw material. Where they scraped their hides, produced their scrapers, and discarded their scrapers (and why) were also important aspects to start gathering information on household spatial patterns. I collected unused and used stone scrapers from each stone-using hide-worker. I did not collect glass or iron scrapers. My goal was to collect at least 30 unused and 30 used-up stone scrapers from each district from as many individuals as possible and from several of the more common clans (e.g., Gezemala, Zutuma, Damota, etc.). This resulted in a survey collection of 130 unused and 182 used-up scrapers. I measured every hide-worker's handle in terms of its length, width, and thickness, and I measured the sockets of each handle with a pair of calipers. The handle

measurements and scraper collection allowed me to compare the geographical distance and social differences of hide-workers against the similarities and differences manifest in their material culture.

I recorded the location of the hide-workers' villages on 1:50,000 topographic maps and recorded as closely as possible the locations of their stone quarries. I also tried to record the location of the hide-worker's households within each village. This allowed me to determine the elevation of each village and the local availability and distance to resources related to hide-working (i.e., chert, wood, and mastic for handles).

I used a questionnaire (which was added to throughout the survey) to determine the hide-workers' present and past economic, social, and political positions. I asked informants which markets they attended to evaluate their access to possible resources including materials from outside the Gamo region. I learned about the source and types of hides scraped and the products they made out of them. The number of hides scraped per week and the price or exchange goods received for the labor of scraping the hides was also assessed. I asked if they scraped hides for demand or for the market, and if they scraped on demand if they worked for particular families. I examined whether they owned land and why or why not, when they received the land and from whom, where the land was located and its suitability for agriculture, and the types of crops they planted. I asked whether there was any time of the year when hide-working labor increased and why. To further my knowledge about household economics and the possible origin of resources, I recorded the economic responsibilities of their wives and children.

The brief interviews during this stage also focused on gathering preliminary information concerning kinship and other types of social relationships (e.g., intraethnic, district (*dere*), subdistrict (*mota*), village (*guta*), and clan (*omo*)) the endogamous hide-workers have with others in their community. Furthermore, I asked how long the hide-worker and his lineage had lived in the current village. The construction of diagrams concerning hide-worker kinship relations provided the basis to link scraper form to social organization in terms of moiety, clan, and lineage relationships. It also allowed me to determine how hide-workers related to hide-workers in other villages and districts through marriage, and how and if this affected their resource acquisition and material culture. I entered the names and location of hide-workers and their kin in a database while in the field. I printed this list out and took it with me for the interviews. This allowed me to crosscheck kinship relationships and verify long-distance kinship and marriage patterns.

I collected histories concerning hide-workers ritual-political leaders (*degala Halakas*) and how they were elected to determine their social relationships within their own caste group. I questioned them concerning their roles in rituals surrounding birth, puberty, and marriage rites of passage, and death within the larger Gamo society in which they interacted as members of a *guta* (village), *mota* (subdistrict), and *dere* (district). The latter enabled me to assess the social position and relationships of hide-workers to other members of Gamo society.

The survey information led me to understand more clearly the environmental and social relationships important to the Gamo hide-workers and how they can be tied to household, intrasite, and intersite analysis of material culture (Figure 2-1). People

not only produce their materials but they organize themselves and their materials in meaningful spatial patterns within their subcultures. Other studies also have pointed out that the focus of archaeology has tended to be on the broader regional cultural scale, because of the idea that culture is homogenous (Crumley 1979; Marquardt and Crumley 1987). Accepting cultural heterogeneity and examining spatial relationships of materials within a culture offers the potential to explore more thoroughly the meanings behind variation whether it be functional or stylistic, or a combination. The Gamo emically defined socio-economic relationships symbolically tie them to specific locations in the landscape.

Individual hide-workers collect their own resources for hide-working and produce and use their own scrapers (Figure 2-1). The most important learning unit in hide-working is the father-and-son relationship. Sons learn knapping and scraping from their fathers and furthermore they tend to live within the same village in close proximity. Hence, intrasite assemblage comparison of scrapers should reveal father-son clustering in terms of scraper morphology and distribution within a site. Furthermore, within a village, the individual is the member of a lineage, which includes grandfathers, uncles, and cousins who also share information that should reflect similarities in their scraper assemblages on an intrasite/village level.

Each village may consist of lineages belonging to the same clan or to multiple clans. The Gamo clans are divided into two groups, moieties, which exchange spouses. Since residence is virilocal and stone tool production is a male-dominated trade in Gamo society, moiety membership may also be expressed in scraper morphology and related to residence. Lastly, the survey determined that the hide-

workers identify themselves closely with membership within districts, which also may be reflected in their stone tools. After my survey of the Gamo hide-workers, I worked with a limited number of hide-workers to understand three aspects of scraper morphology. First, the production, use, and discard of scrapers within the household and village contexts. Second, the social and economic relationships and how they afforded access and decisions concerning acquisition of resources. Lastly, I sought to explore the relationships between socio-economic membership, scraper morphology, and the context of scrapers.

Individual	➔	household assemblage
Domestic group	➔	cluster of related households intravillage assemblage
Lineage	➔	village assemblage
Moieties and Clans	➔	intervillage kin related assemblages
Districts	➔	intervillage ritual-political related assemblages
Subregions (north, central, south)	➔	lowland verses highland and geographical divisions based on rivers and mountains, subregional studies
Ethnicity	➔	Western highland-lowland region of Lake Abaya and Chamo, regional analysis

Figure 2-1: Diagram illustrating cultural and spatial relationships of material culture.

Localized Village Studies

I studied four villages in-depth to focus on scraper production, use, and discard and the hide-workers' social, economic, and political position within society. I selected four villages in which the hide-workers: 1) only use stone; 2) use different handle types; 3) represent different clans; and 4) represent several generations from one lineage within a village. I decided to become the student of 30 individual hide-workers, who are members of four different clans (Gezemala, Zutuma, Bolosa, and Maagata). These individuals live in four different villages located in two districts (Borada and Zada).

My survey indicated that only four Gamo districts *(deres)* have villages that use stone to the exclusion of glass and iron: Borada, Zada, Ochollo, and Bonke. Because I was studying kinship and learning practices, I wanted to study villages in which there were several generations of hide-workers and possibly many individuals related as cousins, fathers, and sons. In Ochollo and Bonke, each village had only one or two hide-workers and so I chose not to conduct in-depth studies in these districts. This left me with selecting villages in Borada and Zada.

In order to discern if variation is the result of social groups or function, I wanted to study members of the same clan using the two Gamo handle types, *tutuma* (single-hafted nonmastic) and *zucano* (double-hafted mastic), even if in the past both types were used. My reasoning here was that individuals of the same clan should make a similar scraper form regardless of handle type because they are descendants from a common ancestor and stone tool production is a learned skill through the patrilineal line. Unfortunately, there were no two villages with hide-workers

belonging to the same clan and using different handles, which represented several generations of individuals from the same lineage. This in itself suggests that clans are closely tied to residence and specific handle types. I decided to study four different villages that represented four clans--two villages using *tutuma (*single-hafted nonmastic) handles (Zutuma and Bolosa clans) and two villages using *zucano* (double-hafted mastic) handles (Gezemala and Maagata clans). This would at least allow me to determine whether regularities associated with handle type would cross village membership. I selected the villages of Mogesa Shongalay, Eeyahoo Shongalay, Amure Dembe Chileshe, and Patela Tsela (Figure 2-2).

Shongalay

Between July and September 1997, I worked with the ten hide-workers living in Shongalay. Shongalay *mota* (subdistrict) is part of Borada *dere* (district) and consists of four villages (*guta*): Mogesa, Eeyahoo, Garay, and Agaya. In 1996, Shongalay had a population of approximately 1229 (529 males and 637 females) within 230 households (Hasen 1996a:314). Two of the villages, Mogesa and Eeyahoo, have hide-workers belonging to the Gezemala and Bolosa clans and I worked in both villages. Traveling to Shongalay was not easy. Shongalay is located a one and half- hour drive (16-km) north of Chencha (Figure 2-2). The villages of Eeyahoo and Mogesa are located to the east about 10-km or a two-hour walk from the main road.

In Mogesa, the hide-workers all use a *zucano* (double-hafted mastic) handle with chert and obsidian. They belong to the same patrilineage of the Gezemala clan represented by three elders and their descendants. They each own a small plot of

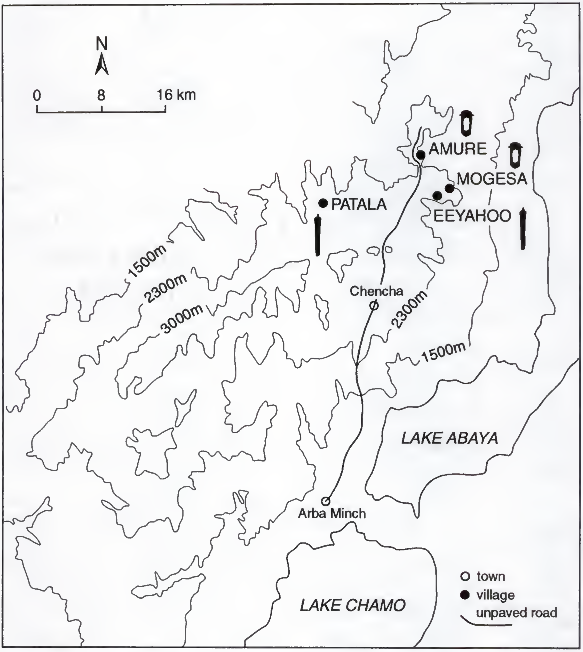


Figure 2-2: Map locating the four villages (Amure, Mogesa, Eeyahoo, and Patela) I studied in-depth within the Gamo territory.

farmland located two hours from their village. They very reluctantly complained about the condition of the land (which is not located near a good source of water and has many stones), for fear that the land would be taken away. The younger hide-workers practice Islam, but the elders did not practice an organized world religion.

I also worked with the three hide-workers living in Eeyahoo Shongalay. They all use a *tutuma* (single-hafted nonmastic) handle with chert. The Eeyahoo hide-workers have all recently moved to Shongalay. I chose this village to work in because I wanted to study a group of hide-workers who had moved from one village to another. Would their hide-working materials and activities reflect their fathers' or would they more closely resemble local hide-workers in Mogesa Shongalay? Perhaps changes in the availability in resources and contact with nonkin hide-workers would affect their assemblage. Hence, I also collected hide-working materials and ethnographic information from the fathers of the Eeyahoo hide-workers. The first hide-worker to move to Eeyahoo said he moved to Eeyahoo because he was able to acquire land there (in the late 1970s when the socialist government redistributed land). He also stated that he was able to move to Shongalay because he was Gezemala like the other Shongalay hide-workers and so he had the right to live there. He is in his late 70s or 80s and no longer scrapes hides. The next two hide-workers, who moved to Eeyahoo, are brothers of the Bolosa clan from Ezo Kogo. Their mother left their father and came to Eeyahoo to work for a farmer. The farmer gave her and her sons land in exchange for their labor. The fourth hide-worker moved to Shongalay from Birbir Kogo and his clan is Gezemala. He moved to the village when he was a child to help his sister, who married an Eeyahoo smith. Although the four

hide-workers live near each other, within a kilometer, they do not live in a tight cluster, as do the Mogesa hide-workers. They each own a small plot of farmland located adjacent to their household on heavily eroding steep slopes. The three younger hide-workers claim membership in the Protestant church, although they do not actually ever go to church.

Dembe Chileshe

Between December 1997 and January 1998, I worked with nine hide-workers living in Dembe Chileshe. Dembe Chileshe has a population of approximately 3113 (1581 males and 1532 females) within 577 households (Hasen 1996a:314). Dembe Chileshe *mota* (subdistrict) is part of Borada *dere* (district) and consists of 15 *guta* (villages): Amure, Abaya, Esera, Yayago, Holay, Zagay, Tocala, Gandala, Wuday, Hylasos, Tumacaro, Garero, Gargetchay, Seratay, and Kueso. Only one village, Amure, has hide-workers. Amure is easily accessible, as it lays adjacent to the main north-south road running through the Gamo highlands (Figure 2-2). It is approximately 20-km north of Chencha. Despite the fact that Amure hide-workers live near a large market center (Chileshe), where glass is easily obtainable, they continue to use chert because they prefer it.

The Amure hide-workers who use a *zucano* (double-hafted mastic) handle with chert. They belong to the same patrilineage of the Maagata clan represented by two elders and their sons, nephews, and cousins. The Amure hide-workers live in a cluster of households on the northern edge lower edge of the village. They each own a small plot of farmland located one hour from their village. They also very reluctantly complained about the condition of the land for fear that the land would be

taken away. Like the Eeyahoo hide-workers, the Amure hide-workers claim to be Protestants even though they do not go to church services. In both villages, the farmers are predominately Protestant. I believe that in both instances there is social pressure for the hide-workers to enlist themselves into Protestant practices such as not smoking tobacco or drinking alcohol to get along with others in their community.

Tsela

Between January 1998 and March 1998, I worked with eleven hide-workers living in Tsela. In 1996, Tsela had a population of approximately 3128 (1542 males and 1586 females) within 596 households (Hasen 1996a:315). Tsela *mota* (subdistrict) is part of Zada *dere* (district) and consists of seven *gutas* (villages) including Atza, Hurooma, Terdo, Chaba/Patela, Zato/Henaso, Bageda, and Ochollo. Four of these villages, Bageda (8), Henaso (1), Ochollo (10), and Patela (11), have hide-workers. The branch road into Zada, which is located approximately 4-km north of Chencha, is only seasonal passable by automobile (Figure 2-2). Without the road, it would be a 4-hour walk from the main road to Patela. I worked in Patela Tsela during the dry season. After a 1-1/2 hour drive (8-km) on the very rough branch road, I walked another hour (4-km) to Patela. The other Tsela villages are located farther west than Patela.

The Patela hide-workers use a *tutuma* (single-hafted nonmastic) handle and chert. They belong to the same patrilineage of the Zutuma clan represented by two elders and their sons, nephews, and cousins. Most of the hide-workers live in a cluster of households on the southwestern edge of the village, however two individuals live about 2-km to the east because the original land was getting too

crowded. They each own a small plot of farmland located one hour from their village. The Patela hide-workers gave me a variety of answers concerning their religious affiliations including Orthodox and Protestant. Often I would receive different answers from the same individual, which suggests to me that they do not practice an organized world religion.

The study of these four villages allowed me to examine in detail the significant social scales of analysis in Gamo society and how they relate to stone scrapers. The interviews were less structured than those guided by my questionnaire in the survey phase. I tried to build on the survey information and questions that were elicited by my observations while living within the different villages. I witnessed each of the thirty hide-workers produce and use scrapers, which is essential to assess factors such as division of labor, spatial distributions, site formation, and the final tool morphology. In the end, I studied the hide-working practices of twenty-nine adults and one teenager. There was great variability in the amount of time it took to scrape a hide (two hours to three days) and in the number of scrapers used (one to eight). Subsequently, I was only able to watch each hide-worker scrape one hide.

After I had watched each person scrape a hide, I would give him several zip-lock bags. I requested that in my absence whenever they scraped a hide to place the used-up scrapers in a bag. One collection bag of scrapers equaled one hide-scraping event. In three of my villages, this worked out well even if they did not return a collection of thirty scrapers per individual (as I never specified the number I was trying to achieve); in the end, I felt that each collection bag represented a single event. In the third village (Patela), two of the hide-workers had obviously just

collected scrapers from their fields (as they were covered with soil) and thrown them in the bag. They decided that they would keep the other bags for themselves (although I would have given them some). The latter samples were not included when I determined the number of scrapers per hide-working event or the morphology of scrapers based on types of hides (see Chapter 4). I also observed each person making thirty new scrapers either at the quarry or at their household, depending on their habit.

I provided a stone tool-sorting test for the Gamo hide-workers living in the villages of Amure, Patela, Mogesa, and Eeyahoo. Although I knew the context of all the scrapers in the test, the hide-workers did not. The stone tool assemblage consisted of scrapers in a variety of raw material colors both unused and used-up scrapers from all four villages. Although I asked individual hide-workers to pile sort the scrapers, the hide-workers conducted the sorting in a group effort rather than as individuals. The purpose of the sorting test was to determine if the hide-workers represent their identity with intent on any level in the production of their stone tools, and if they could later identify their own scrapers in terms of specific attributes. In essence, I wanted to know if they consciously or unconsciously represented their social groups through their stone tools. I began by asking them to sort the pile of stones into any groups they thought were significant. They did not seem to understand and so I asked more direct questions: 1) which scrapers would you use and why or why not, 2) which scrapers were made for a *tutuma* (single-hafted nonmastic) and which for a *zucano* (double-hafted mastic) and how do you distinguish them, 3) which scrapers

were made in your village and how do you know, and 4) which scrapers did you make and how do you know?

I watched, videotaped, and photographed the hide-workers search quarries for raw materials, produce stone scrapers, haft the scrapers, use the scrapers, and discard the scrapers. I made a general map of each household lithic production, use, and discard areas within the village. I requested a vocabulary relating to hide-working and the stone tools.

Although stylistic preference may be reflected in the selection of raw materials, it also may be constricted by geographical and socio-political factors. The origins of the raw materials may be critical in assessing this aspect of variation. I questioned the hide-workers concerning their choice in raw material selection (including the presence of color, cortex, and patina).

The size and shape of the scraper produced may be a direct reflection of the type of handle in which it is to be fixed. The different handles and binding materials may produce different microscars on the portion of the scraper to which it is affixed. Thus, I measured the handles (length, width, and thickness) and their sockets (height, width, and sometimes depth). I also inquired about the type of mastic and how it was acquired and made.

The working edge of the tool may be affected by the size and type of hide that is processed, by the type of tool that is used for retouch, by the tension angle at which the hide is bolstered, and by how many times it is used before resharpening. The direction in which they scrape the hide may be group-specific and reflected in the orientation of striations found on the ventral surface of the scrapers. I measured the

height, width, and angle (using a climometer) of the scraping frame and the hide stretched on the frame. The thickness of the hide was measured, as well as its length and width. I also counted the number of times the enset rope was woven through the hide to lash it to the scraping frame to determine tension. During scraping, I recorded the direction of the scrapes and the part of the hide scraped, i.e., upper center, lower center, upper left, etc.

The size and shape of a scraper may change through use and thus it was important to take measurements of scrapers before and during their use. I measured and drew each individual iron billet used to shape the scrapers. I measured the scraper's length, width, and thickness (using metric calipers), and edge angle (using a goniometer) before it was hafted. After a tool was hafted I measured the length it protruded from the socket and if possible the edge angle. Since the hide-workers do not discard scrapers until they are exhausted, often partially used scrapers were already hafted and used for the scraping event I witnessed. In this instance, all I could do was measure the length and angle of the scraper as it protruded from the handle. I measured the length and edge angle of each scraper during breaks in scraping and after they resharpened the scraper. This would determine how much resharpening and reduction was required after particular activities.

I recorded in a notebook using a manual counter the number of times they resharpened and then used each scraper to scrape and chop. The numbers recorded in my notebook were checked against the videotape to insure accurate counting of the number of scrapes, chops, and retouching activities. Hide-workers often used two or more handles, so I tied ribbons on the handles, to make sure I knew which handle and

scraper was being used, and which side of the *zucano* (double-hafted mastic) handle was being used. This made it easier to keep track of when and where each scraper was being used on the hide.

I asked the hide-workers to resharpen the scrapers over a piece of cloth so that I could collect all the retouch from each scraper that I observed used. One person's retouch from one day's work was collected together (i.e., one collection bag may represent several scrapers retouch flakes). At the end of the event, I collected all the scrapers used-up and partially used. I also remeasured the thickness of the hide.

Scraper Analyses

My final collection of Gamo stone scrapers totaled 2139, which consisted of 312 survey scrapers collected from the survey and 1827 scrapers collected from the four villages. The bases of my analyses are the contextual data obtained through interviews and the unused (n= 941, 130 survey and 811 village), broken (n=42) or partially used (n=93), and used-up (n=1054, 182 survey and 881 village) scrapers. These stages of use and disuse were emically determined by the hide-workers. Unused scrapers are defined as those scrapers which are ready for use but have not yet been engaged in preparing a hide. Partially used scrapers are scrapers that have been used on a hide and are still useable. Hide-workers were very reluctant to give-up partially used scrapers even when I offered them money in exchange. Used-up scrapers are those scrapers that have been used to prepare a hide but are no longer considered useable by the hide-worker, i.e., scrapers that can be discarded. I did not

conduct excavations of prehistoric or historic archaeological sites or modern trash pits.

In addition to the cultural context of each stone scraper that I collected, I also recorded aspects of its morphology in an attribute analysis. I measured and assessed all the attributes on each of the 2139 scrapers twice, and I went through the collection a third time randomly checking measurements to avoid mistakes and ensure accuracy or at least consistency in my measurements. Ethiopia's regulations concerning bringing cultural materials out of the country are very strict and so I completed the analyses while I was living in Ethiopia. Conducting the analyses in the field was useful when questions arose concerning the context of the scraper. It allowed me to ask specific questions concerning the presence of attributes such as spurs, ventral thinning, etc. The equipment used for the attribute analysis included a set of metric calipers, a goniometer, a 20x hand-lens, and an Ohaus balance (400 x 0.1g). I did not have access to a microscope with polarized light (no electricity) and so microwear studies were all completed with the 20x hand-lens. I have not provided my raw measurements in the appendix, as I will publish them in the future. However, Appendix C does provide the formulas I used to perform t-test, chi-square, covariance analysis, as well as means, co-variation, and the results of the statistical tests.

Unlike archaeological tools that may have attributes as the result of postdepositional damage, all of the attributes on the Gamo tools were the result of predepositional human activity. The attributes I examined are a combination of those described to me as important to the Gamo and those thought to be significant by archaeologists. Archaeologists have created by far many more attributes under study

than the Gamo would consider important. Archaeologists have difficulties in deciding which attributes represent which type of explanation in terms of function verses style. Stylists are quicker to admit that to designate a fixed catalogue of attributes representing style is difficult because style is dependent on spatial and contextual data. The isochrestic approach to style advocates that it is a sum of the different components of the overall morphology of an object rather than individual attributes that identify style (Sackett 1985, 1989). There is no consensus among archaeologists as to which stone tool attributes represent variation as a result of style, function, or a combination of the two.

The Gamo consciously recognize the type (color) of raw material as an important aspect of the tool. Archaeologists have also determined a lithic's utilitarian meaning and style through the raw material type (Close 1989; Gould et al. 1971; Gould 1974; Jelinek 1976; Luedtke 1976; Sackett 1985:280). The color of the chert is important to the hide-workers because they associate specific colors with better conchoidal fracturing. They blow on the stone and if there is a shiny reflection, they consider it good for flaking. They feel that patina on the chert indicates that it is old and poor for flaking, although they occasionally use it. They remove cortex as much as possible, as they consider it poor for flaking and achieving a sharp working edge. I used a combination of the emic color descriptions and the Munsel Rock Color chart to record the color of the scrapers. I recorded the amount of cortex relating to its percentage of coverage over the entire tool and not just on the dorsal face of the tool, because this seemed important to the hide-workers. I also recorded the presence or absence of patina.

The hide-workers also examine thickness, length, and width to determine their scrapers' stage of use and acceptability for hafting. They assess the thickness of the proximal end and the width to ensure that a scraper will fit within the haft. Furthermore, a scraper must not be too long or too thin, as it will break during use. The sharpness of the working edge is determined by examining the distal thickness and the amount of projections on the ventral side of the edge. That is, they examine the ventral side of the tool, which touches the hide rather than the dorsal-side which archaeologists generally study. After they resharpen an edge, they flip the scraper over to look at the dorsal side to again examine the thickness and angle for its suitability in either scraping or chopping activities. Archaeologists also explore the overall morphology of stone tools such as length, width and thickness, as well as other features such as dorsal scar pattern (the pattern of flake removal from the dorsal side of the tool), location and type platform (the surface area on the tool where it was hit for its removal from the parent material), cross-section (a view of the tool with one of the lateral edges facing upward), and edge forms (the shape of the edges of the tool)-- to determine the type of production and stage of use of the tool and the identity of the maker (Bordes 1961, 1973; Bordes and de Sonneville-Bordes 1970; de Sonneville-Bordes 1954; Dibble 1984, 1987; Kuhn 1992; Sackett 1989, 1990). Hence, I took several metric measurements of each scraper including: maximum length, proximal width, medial width, and distal width, distal thickness, proximal thickness, retouch length (Figure 2-3). My typology concerning platform type, dorsal scar pattern, and cross-section was based on typologies derived for Stone Age

assemblages in East Africa by Clark and Kleindienst (1974) and Melman (1989:128-132).

I also questioned the hide-workers concerning other attributes, which I noted on their tools such as the presence of spurs, distal edge hinge fractures, lateral notching, dorsal spine flake removal, and ventral thinning (Figure 2-4). Microwear studies of lateral notching, crushing, ventral thinning, and crushing of dorsal ridge are all techniques thought to be associated with the hafting of scrapers (Beyeries 1988; Deacon and Deacon 1980; Hayden 1979; Keeley 1982; McNiven 1994; Rule and Evans 1985:214; Shott 1995). Previous researchers believe that knappers created spurs either on purpose for use as engravers (Rogers 1986; Wilmsen 1968) or as the result of reuse of a scraper after it has broken (Rule and Evans 1985).

The hide-workers, in the sorting tests, ascribed used-up tools as those that were thicker, duller, and with more retouch. They also distinguished scrapers by handle types based on retouch location and invasiveness. Experimental studies of hide-working have recorded the presence of rounding of the used edge, striatures, and a luster or polish especially after use on drier hides (Brink 1978:94-114; Hayden 1993; Hurcombe 1992:45-46; Keeley 1980:50-53; Kimball 1995; McDevitt 1987; Vaughan 1985:26-27). They also relied on edge angle studies to determine the function of the tool (Brink 1978; Wilmsen 1968). The edge angle and the location of retouch also are considered as elements of social identity (Bordes 1961; de Sonneville-Bordes 1954; Close 1977, 1989; Sackett 1985). In addition, weight has been offered as a mean to distinguish the function of a tool (Cantwell 1979). Therefore, I also took edge angle measurements of the distal, laterals, and proximal

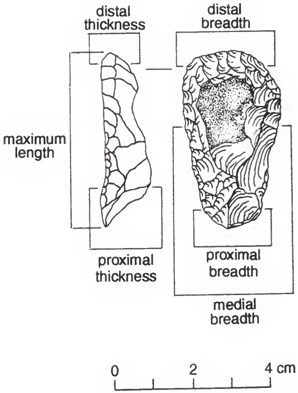


Figure 2-3: Illustration of a Gamo scraper indicating the morphological measurement for analysis.

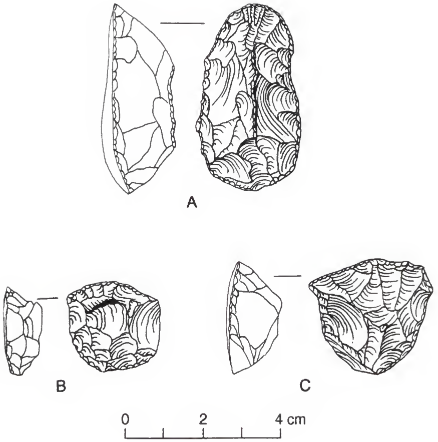


Figure 2-4: Illustration of Gamo scrapers with dorsal spine removal (A), undercut (B), and spur (C).

edges (Figure 2-3). On the distal edge I took three measurements--one on the left, right, and center--and combined these for an average edge angle. I also recorded the arch of the retouch and location of the retouch (ventral, dorsal, lateral, distal, etc.). I measured the depth of or invasiveness of the retouch with calipers on all edges for all the tools. I weighed the scrapers and used a 20x hand-lens to look for channels, striations, notches, and rounding, but only on the working edges of the scrapers, that I directly observed used.

The Gamo stone scraper collection represents in archaeological terminology a single cultural horizon or assemblage. The time depth of this collection is extremely short and hence represents what archaeologists would term a single cultural period in a restricted geographic region. It is not the purpose of this study to provide a model of stone tool variation through time, only across space within a single time unit.

Premise

This ethnoarchaeological study of the Gamo hide-workers concentrates on a contextualized understanding of stone scrapers. A contextualized approach to ethnoarchaeology unmasks the heterogeneous nature of culture revealing the necessary background information to infer the meanings behind material variation. This method is scientific and exposes our ethnocentric interpretations of the past. Arguably, people who continue to produce similar materials as that of past people might be able to provide insights that are not conceivable to the archaeologist, who is not familiar with the material on a daily basis. Hence, my two-year study of the Gamo hide-workers focused upon emic perceptions concerning stone tool

morphology to expand our knowledge concerning the meanings behind stone tool variation.

CHAPTER 3
CONTEXTUALIZING STONE TOOL VARIABILITY: THE GAMO ENVIRONMENT AND CULTURE

The Gamo environmental resources and their economic, political, and social relations provide the context for understanding functional and stylistic variation in the morphology and distribution of their stone tools. Too often, ethnoarchaeological studies lack an in-depth understanding of the environment and culture associated with the materials they are studying. However, as argued in the previous chapter, only a contextualized approach reveals the necessary background to expose the expressed material similarities and differences.

The Gamo are agriculturists who live in the highland-lowland region to the east of the Rift Valley lakes of Abaya and Chamo. The biannual rains and numerous rivers erode the rich basaltic foundation exposing chert sources for stone tool production and use, and creating broad valleys for agriculture. Major rivers and mountains signal the boundaries between the Gamo political districts (*deres*). Each village (*guta*) has an open field with a centrally located tree or forest marking the village meeting place (*debusha*), where elders and ritual-political leaders meet to resolve social and political issues. The thatched houses and associated agricultural fields of villages cluster by settled lineages. The smaller and often poorly thatched households are located on lower or higher portions of villages, usually on extreme slopes, where gardening is difficult. This division of the village landscape is an

indication of social stratification distinguishing the households of artisans, including the hide-workers, whom I studied for two years.

This chapter reviews aspects of the Gamo environment for possible sources of functional variation associated with stone scrapers, and it also examines Gamo culture and social identities to reveal possible sources of stone tool stylistic variation. The Gamo live in a diverse region that includes both highland and lowland environments. This potentially could affect the resources they chose and the way in which they use them, and offer functional explanations for stone tool variation. Their social structure also lends itself to examining differences and similarities in material culture, including stone tools, differentiated in terms of intraethnic divisions such as: subregions, political districts (*deres*), villages, moieties, clans, lineages, and domestic groups.

Evaluating Function: Regional Environment, Resources, and Economy

Examining the regional setting of the Gamo provides for an understanding of the locally available resources. The hide-workers' economic position within Gamo society dictates their ability to access resources for their craft and the activities associated with the hide-working process. If the environment and activities in which a stone tool are used account for most of the synchronic variability, then formal variation in Gamo scrapers should have no significant variation among hide-workers who engage in the same hide-working activities. Variation in the scrapers will only differ when there are differences in resources and activities such as scraping with different types of raw material, scraping different types of hide, and the scraping of a

hide for different products. The latter are dependent on the geography of the Gamo territory and their economic relationships.

The hide-workers scrape cattle hides primarily for bedding. Today in addition to scraping hides, the hide-workers engage in other craft-production activities such as producing baskets and horn-made spoons, wood-working, and iron-working. The wives of the hide-workers spin cotton, collect grass, decorate gourds, produce *uncha* (fermented bread) from enset to sell at the market, cook, collect water, and care for children. If a hide-worker owns land, his wife fertilizes the fields and weeds them almost continuously throughout the year. She also harvests and prepares all foodstuffs. The children of hide-workers rarely attend school because they cannot afford supplies or uniforms. The sons often spend their days tending to the domesticated stock, which belong to *mala* (citizens and farmers). The daughters care for younger children and aid their mothers with their work.

Most Gamo artisans, including hide-workers, live in the highland (*geza*) region of the Gamo territory. The Gamo territory covers a 2400-km^2 region with elevation ranging from 1200 to above 3000 meters (Figure 3-1). They recognize two environmental zones: the highlands (*geza*) (2300-3000 meters) and the lowlands (*baso*) (1500-2300 meters) (Cartledge 1995:46-50; Jackson et al. 1969:1-5; Jackson 1970). The region above 3000 meters has little settlement due to the inhospitable nature of the land formations and environment for agriculture. The *geza* is a cool moist zone with the highest population densities and agricultural production. The lowland area was not settled until encouragement from the socialist government (circa 1977), which opened the area through its programs of Villagization and state

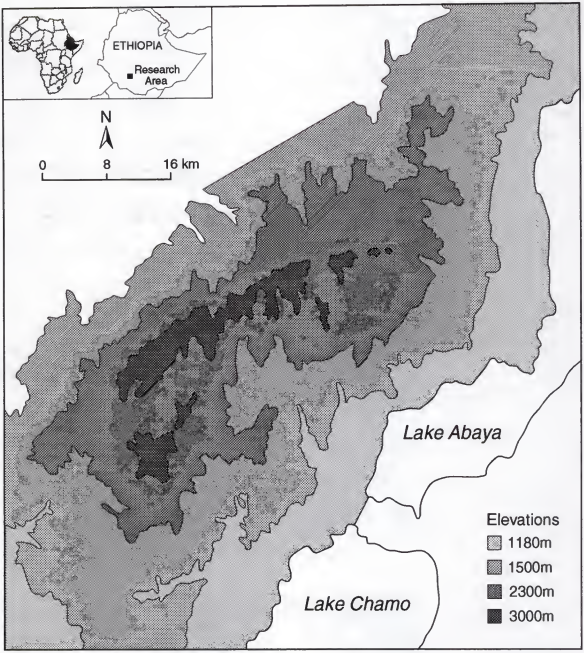


Figure 3-1: Map illustrating the elevation differences in the region where the Gamo live.

farms (Gilkes 1994:354-355; Van Buren 1993:127-129). Artisans do not generally live in the lowland regions because the farmers believe they will pollute the fields, which already have poor yield because of the environmental circumstance. Furthermore, there are no clays for potters, and hides rot quickly in the heat, making hide-working a difficult pursuit.

The Gamo hide-workers use chert and obsidian as their medium for tool production. The Gamo highlands represent the southernmost protrusion of late Tertiary lava, which was uplifted and fractured by the Rift Valley. The basaltic plateau of the highlands supports the formation of cryptocrystalline rocks such as chert. All the Gamo chert sources are located at an elevation of circa 2000 meters, which the Gamo consider lowland (*baso*) territory. To the north of the Gamo in the Wolayta highlands, the volcanic environment created obsidian deposits. The hide-workers exhibit a wide range of procurement strategies including direct access to natural chert outcrops, recycling of archaeological obsidian, and bartering/trading with a middleman for both chert and obsidian. As mentioned in Chapter 1, farmers consider stones worthless and even a cause of infertility to farmland. Since the farmers do not value stones, they allow the hide-workers to collect this resource without charge. In some instances, hide-workers sell chert and obsidian to one another (discussed in Chapter 4).

Cherts are available only seasonally during the rains, which erode the nodules out from their basaltic sources into streambeds. The Gamo region is located in the Intertropical Convergence Zone (ITC) and so receives two annual seasons of rainfall: the little rains that occur between March and May, and the big rains that last from

July through early September (Gamachu 1977:6-7). During the rainy seasons, the hide-workers visit the quarries at least once a week. This limits the amount and timing of resources available for hide scraping. Consequently, further study of the hide-workers has the potential to reveal the cultural and economic factors that influence the decision to use a particular material (Torrence 1986:61-65).

The hide-workers also use wood, mastic, and hides for their craft that they collect from both the highland (*geza*) and lowland (*baso*) environments. The highland vegetation includes junipers, eucalyptus, and bamboo, which the hide-workers use to produce their *tutuma* (single hafted nonmastic) handles. In addition to the highland woods, the hide-workers use the lowland acacia wood and mastic to make *zucano* (double-hafted mastic) handles. The highland regions harbor antelope, wild fowl, monkeys, porcupine, hyena, leopard, jackals, and fox. The lowland area has many species of monkeys, antelope, and crocodile. In the past, lion, elephant, rhinoceros, hippopotamus, and buffalo were also present as evident from the presence of shields made of these animal hides, which the hide-workers made (Cartledge 1995:276). Today, hide-workers scrape both highland and lowland cattle hides, which they distinguish, based on the thickness and roughness of the hide. The types of animals available are important for assessing the types of hides the Gamo scrape, which may affect the use wear and morphology of the scrapers. The opportunity is thus open for exploring how culture and environment intersect in material culture (i.e., handle and scraper type).

The hide-worker obtains hides through his patron-client relationship (mayla) with neighboring farmers (*mala*). Domesticated animals such as cattle (*Bos indicus*),

sheep (*Ovis aries*), or goats (*Capra hircus*) may be found within a hide-worker's household. However, the hide-worker does not own them, he only cares for them and uses their products. During the holidays, the farmers give the head, entrails, legs, and tail to the hide-worker as an expected gift. The *mala* consider these parts of the animal, especially the entrails, as potentially dangerous to eat, as diviners use them to invoke the sources of taboo infractions. It is also during the holidays, when they slaughter the animals for sacrifice, that the farmers give the hide-workers hides to scrape. However, the hide does not actually belong to the hide-worker, who is given it to scrape for a fee, as he cannot sell or give it to another person. Hide-workers predominately scrape hides on demand; because the cost of hides is too much for them to purchase and resell at the market. At the market, the average cost of a raw cattle hide is 9 to 10 ETB (US $1.38 to 1.54) and to purchase a cow costs 600 ETB (US $92.31). If sold at the market, a scraped hide yields 10 to 15 ETB (US$ 1.5 to 3.0). If a hide is scraped for demand, the hide-worker receives crops such as barley and enset or 1 to 3 ETB (US $0.15 to 0.46) in payment.

I estimated the average Gamo hide-worker's yearly income at 104 to 208 ETB (US $16 to 32) based exclusively on scraping hides. Karsten (1972:80), however, estimated a much higher annual income at US $270 based almost exclusively on hide scraping. Karsten noted in the early 1970s that the Gamo hide-workers had no cash crop farmland only small gardens associated with their homes. An explanation for the differences in hide-workers income between my own study and Karsten's may be offered in the following discussion of the political and economic changes since the 1970s.

Until recently, hide-workers only owned small plots of land for their house and a garden; they did not own farmland. In 1975, land reform, the most successful and popular of the revolution's policies, was enacted. In September 1974, the coordinating committee (PMAC) or "Derg," a socialist government, replaced Haile Selassie's imperial regime (Gilkes 1994:353-354). The radical redistribution of land resulted in the complete abolition of landlords, which had been one of the chief causes of inequity during the previous regime. During this period, artisans who previously had no land to farm, such as the Gamo hide-workers, acquired land. In comparison to farmers' croplands, the hide-workers own very small parcels of land, and they are usually located on the poorest local soils containing many rocks and boulders with insufficient access to water and sometimes steeply graded.

Since the end of the socialist government in 1991, some hide-workers (35 percent of the survey population, n=180 individuals) lost their land when they were accused of witchcraft and criminal activity. Even for those hide-workers who continue to own farmland, it can be difficult to maintain hide-working practices while farming. The Gamo highlands have two rainy seasons, and subsequently two planting and harvesting seasons (Jackson et al. 1969:4; Jackson 1970:5). Women are responsible for processing and harvesting, while men prepare the soil and plant crops. The Gamo plant their major food crops of enset, legumes, wheat, and barley from March to April and from July to August (Cartledge 1995:161; Olmstead 1974b). In addition, the Gamo plant the smaller crops (potatoes, cabbage, and tobacco) from June to September. This means that the planting seasons overlap with

the chert procurement periods (see the above description in this chapter for the stone procurement period).

During the socialist government, there was also an increase in export of hides, especially goat hides to Italy, France, West Germany, United Kingdom, and the Netherlands (Hailu 1980). In 1959, the net worth of exported hides was US $9 million (Lakew 1969), in 1974-5 it was US $56 million, and by 1990 it had risen to US $215 million (Hasen 1996b). The demand for goat hides in Addis Ababa raised rural local market prices. Hides, especially goat hides, are brought through the rural market system to Addis Ababa, where they are tanned in industrial shops for export. Hide-workers usually are not included in the sale of hides because they do not own them. However, occasionally, hide-workers will sell a hide for a farmer for a small commission. In addition, there has been an increased distribution of western clothing, agricultural sacks, rope, and string in rural Ethiopia replacing many of the items previously made out of hides. The reduced local demand for hide products means that hide-working skills are diminishing and in less demand today than they were thirty years ago.

In a population of over 600,000 (Hasen 1996a:313-318), my survey revealed that hide-workers and their families represent only 0.25 percent of the population, a dramatic decrease from Karsten's estimation at 0.4 percent in 1972. The hide-working population and demand for hide products is diminishing, resulting in changes in the available resource base and the material culture associated with hide-working (i.e., types of scraper raw materials, hafting, and types of hide scraped). In the past, the hide-workers were dependent primarily on the exchange of their craft

goods to obtain food. They produce commodities used by almost every household out of materials such as stone and hides, which are otherwise useless in Gamo society. However, the acquisition of land and the introduction of new materials such as glass must have an effect on hide-working practices. The Gamo hide-workers acquire their chert or obsidian from either a market or a quarry, but now many also use glass. The local environment and external influences must in many ways affect the types of leather products in demand (saddles, bags, and bedding), the raw material scraper resources (chert, obsidian, and glass), the handles (*tutuma* and *zucano*), and the hides (wild and domesticated animals) that the hide-worker scrape to produce their products. These observations of the hide-workers demonstrate the rich array of potential environmental and economic factors that may affect the life cycle of a stone tool (i.e., length of use life, edge angle and shape, etc.) that in turn may alter its appearance (discussed in Chapter 4).

Evaluating Style: Social Organization

If style and the expression of social identity account for the variability witnessed in the synchronic appearance of Gamo stone tools, then it is important to establish the socio-political memberships that are important to the Gamo people. If style rather than function provides an explanation for material culture variation, scraper morphology will be similar between members of the same social group and different between members who do not share social relationships. Social identity is flexible and exists on several levels in Gamo society including interethnic relations,

and membership in a specific language family, caste, kinship, and ritual-political groups.

Interethnic Relationships

The relationships that the Gamo have with other ethnic groups may affect their access to and knowledge of different resources as well as their craft-production technology. The Gamo are Omotic speaking peoples, and the Omotic languages are now generally considered a branch of the Afro-Asiatic languages (Fleming 1973, 1976), but there is some debate over its relationship with other Afro-Asiatic language families (Hayward 1998). In early travelers' accounts and ethnographies, the Omotic peoples were often referred to as the Sidama (Cerulli 1956:85-132) or the Western Cushitic (Straube 1963). Today, Omotic languages are linguistically separated into a north and south division (Fleming 1973, 1976). The Gamo are southern Omotic speakers (Figure 3-2) belonging to the Ometo group, which also includes the Ganjule (who inhabit an island on Lake Chamo), Gatame-Kachama (island in south of Lake Abaya), Kore-Zayse, Oyda, Basketo, Dime, Hamar and Welamo (the latter includes the Wolayta, Male, Gamo, Gofa, Kullo/Daro, Kunta, Malo, Kucha, Laha, and Marta).

Knowledge of the prehistory of Omotic societies is nonexistent in the absence of archaeological investigation, and relies solely on linguistic reconstructions. The proto-Omotic speakers probably began populating the highlands of Ethiopia 7000 years ago and began cultivating enset (Ehret 1979). Today Omotic societies only occupy southwestern Ethiopia and most cultivate enset (Donham 1985; Lange 1976;

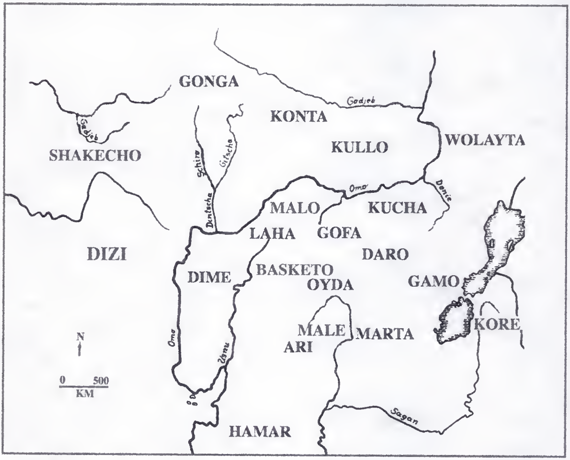


Figure 3-2: Map of southwestern Ethiopia locating the Omotic-speaking groups mentioned in the text (based on a map by Straube 1963:1).

Olmstead 1975; Straube 1963). Omotic peoples' contact with neighboring Cushitic peoples and their shared terms for domesticated stock and grains indicates a borrowing of these foods from their Cushitic neighbors (Ehret 1979).

The history of southern Ethiopia and Omotic people also is fragmentary because of the lack of written records. The historical accounts that exist are based on the written records of their northern neighbors, early travelers' accounts, and later studies of oral history. It was not until between the twelfth and eighteenth centuries, that the Ethiopian state was officially redefined (and mentioned in texts) to include the people of southwestern Ethiopia (Fanta 1985; Lange 1982:1-13; Marcus 1994:19-29). The Wolayta came under the control of northern Ethiopia during the reign of Amda Syon (1312-1343) (Beckingham and Huntingford 1954:LXV). However, it was not until Zara Yaqob (1434-1468) that the Gamo became the southernmost limit of the evangelization of the northern Christian Empire (Bureau 1976). This is evident by the presence of fifteenth-and sixteenth-century Orthodox churches, texts, and crosses in the Gamo region (Azaïs and Chambard 1931:260-269). The Kucha ruled the Gamo, as well as the Wolayta and Kullo, until circa 1550 (Borelli 1890; Beckingham and Huntingford 1954:LXV).

A Muslim invasion instigated by Mohammed Gran (1527-1543) during the fifteenth and sixteenth centuries, conquered most of northern Ethiopia (Marcus 1994:19-29). In addition, there were two Muslim states established in southwestern Ethiopia, Hadiya and Bali (Beckingham and Huntingford 1954:LXIV). Bahrey (1993 reprint of 1593, also see Cerulli 1956:86) wrote in the 16th century that Bali

extended as far south as Lake Abaya, absorbing the Darasa, Gamo, and Kucha. However, Azaïs and Chambard (1931:260-269) and Bureau (1976) believed that the Gamo escaped Moslem domination and remained a stronghold of Christianity. Today there are few people practicing Islam among the Gamo. One Islamic community is located in Shongalay, where I conducted research. Thirty years ago, a man, who moved to the area from the north, brought Islam to Shongalay. The local people converted the Orthodox Church into a mosque.

During the 16th century, the Oromo migrations forced many Omotic peoples to move further south (Abir 1970). Our earliest description of the Gamo people comes from Bahrey who was an ecclesiastic monk living among the Gamo circa 1593 (Bahrey 1993 reprint of 1593). He recounts that the Galla/Oromo invaded and looted his home. Oral histories collected by Abeles (1977) suggest that the Gamo adopted their use of phallic headdress emblems and rites of passage from the Oromo, during this time.

By 1820, the Gamo and most of the other Omotic societies were tributaries to the Omotic king of Kafa (Gonga on Figure 3-2, Beckingham and Huntingford 1954:LXVI). In 1893, Menelik conquered the Kullo, Konto, Gofa, Gamo, and Wolayta (Hodson 1929). The Gamo magistrates carry titles of which the names *Halaka* and *Dana* probably originate from the Amharic *Aleqa* and *Dana* (Bureau 1979). The Gamo, as other conquered peoples, were forced to owe labor and tribute to the Amhara soldiers, who became local settlers and administrators (Marcus 1994:19-20). Under the feudalistic system, the Gamo *Kaos* (ritual-sacrificers for districts) became local administrators (referred to as *Balabat* by the National

Empire), who interacted between the people and the Amhara soldiers (Bureau 1979; Olmstead 1997:29).

In this century, the Gamo have been fully incorporated into the Ethiopia state through periods of control from the national government including: colonialism (1935-1941), feudalism (1941-1974), socialism (1974-1991), and currently a provisional democratic government (Olmstead 1997:29). Italian colonization of Ethiopia was marked mostly by military personnel rather than by civilian settlement (Sbacchi 1985:95-109). The Italian policy was to adapt to traditions, which fractured the Italian administration of Ethiopia across ethnic lines. While the Italians removed national leadership, districts and villages retained local leadership. In contrast, the later socialist government prohibited any social or political act that redeemed any sense of ethnicity in place of nationality. During this time, the Gamo people enacted their ceremonies in secret at night. The Gamo still say the phrase "all people are equal," especially to foreigners, though it is clearly not practiced. Although land was redistributed during the socialist government to include artisans, local leaders denied artisans land and privileges through allegations of criminal activity. The traditional Gamo ritual-social positions became obsolete in the eyes of the new Ethiopian government and were replaced with Chairmen and Peasant Associations.

The maintenance of Gamo identity through these national and local changes can partially be ascribed to the poor attempts of national education and the fact that most Gamo people continue to speak their own language. The education of the rural population was not stressed until during the time of the socialist government and though it is also a focus of the current government, it is estimated that only 20

percent of the Gamo people are literate and attend school (Hasen 1996c:76-79). By maintaining their own language, the Gamo are ensuring the preservation of their ideological organization of nature, people, and the material world. It is not the intent of this research to conduct an in-depth study of the prehistoric or historic position of hide-workers and artisans within Gamo society. However, in Chapter 5, I do explore avenues of oral history, history, and interethnic relationships to explain the current distribution and types of material culture associated with Gamo hide-working.

Intraethnic Social-Political Relationships

Gamo intraethnic relationships include the associations between caste groups, political districts, and sub-regions. The Gamo, like most Ethiopian societies, segregate themselves into noncitizen artisan (*tsoma*) and citizen farmer (*mala*) groups, and restrict artisans with regard to social, economic, and political mobility. Within Gamo society, artisans and farmers are members of political districts (*deres*) that serve as the basis for ritual-political power. Although subregions are a broader category than *dere*s, I discuss subregions last because they envelop variations present in *dere* membership and caste roles.

Caste groups

Although there is some debate concerning the social status of Ethiopian artisans (Cerulli 1956:61-62; Haberland 1984, 1993; Hamar 1987:60; Levine 1974:39; Lewis 1962, 1974; Todd 1978b), Bureau (1976) refers to the Gamo artisans as members of a caste group. Previous studies of Omotic societies suggest that artisans retain low social positions, generally do not own land or participate in

political and judicial life, and yet perform important mediating roles as healers, messengers, and circumcisors (Cerulli 1956:107-108; Donham 1985:107-113; Feyissa 1997; Jensen 1959:422-425; Lange 1982:75-77, 158-162, 261-267; Orent 1969:284-286; Straube 1963:376, 384; Todd 1977b, 1978a, 1978b; Yintso 1995:104-109).

The Gamo artisans are aligned with many of the characteristics listed as associated with caste systems in Indian and Africa (Leach 1960; Sterner and David 1991; Tamari 1991; Tudov and Plotnicov 1970). First, the Gamo social system is a rigid social structure in which the different stratums are associated with traditional occupations. The Gamo system consists of 1) citizens (*mala*) or elected and hereditary leaders, farmers, and weavers and 2) noncitizens (*tsoma*) which incorporate *mana/chinasha* and *degala* (Abeles 1979; Bureau 1981:85-87; Straube 1963:380-384). In Gamo society, potters are usually women and hide-workers, groundstone-makers, and smiths are usually men. The *mana/chinasha* are defined by the occupation of women as potters. Often men *mana/chinasha* own farmland and/or help their wives with pottery procurement and distribution. The *degala* include hide-workers (*gelba katchay*- literally hide scratcher), smiths (*wogatchay* literally the sound of pounding) and groundstone-makers (*sucha wogatchay*- literally stone pounding).

Second, membership in *mala* or *tsoma* is ascribed by birth and there is no social mobility. Third, the Gamo believe that if intercourse occurs between the different stratified groups, the result will be death and/or infertility. Hence, the *mala, degala*, and *mana/chinasha* are each endogamous meaning that they do not marry

one another. Fourth, *tsoma* are not considered full members of Gamo society and during puberty rites (discussed in this chapter below), they are not publicly presented to society to acknowledge their full citizen status.

Fifth, artisans often have a ritual language or argot, which only the artisans know. The Gamo *degala*, including the hide-workers, have their own language (*owdetso*) which is mutually intelligible to all Gamo *degala*, but is not spoken among other ethnic groups. The *mana/chinasha* also have their own language (*manacalay),* which is different from the *degala* language (*owdetso).* They state that they have their own language to keep their secrets from others, i.e., the *mala*. They are unwilling to teach this language to their neighboring *mala* or to westerners, and the language has yet to be studied thoroughly. The few words and phrases that I collected were shared with linguist Christopher Ehret, who suggested that most artisan languages were not distinct, but jargon of the local language.

Lastly, the Gamo reinforce the social submersion of artisans through restrictions on commensality and associating artisans with pollution concepts. They do not share food with *degala* (hide-workers, smiths, and groundstone-makers) or *mana/chinasha* (potters) and only allow them into the vestibule area of their household (Bureau 1975). The smiths are members of both the *degala* and *mala* caste groups, because the *mala* consider iron cast or reheated by *degala* to be polluted and to cause illness for the *mala*. *Mala* smiths make the ritual-sacrificing knife for animals and for circumcision, as well as the hand plow for the *mala*. The *degala* work iron products for the *degala* only. The *degala*, especially, are not allowed to work in the fields of farmers for fear of polluting the crops. The farmers

consider the hide-worker's scraping stones, unscraped hides, and cattle horns to be unclean. Gamo beliefs indicate that use of these items and breaking *goma* (taboos) will disrupt fertility of land and people by upsetting the ancestors.

The Gamo hide-workers and their materials are symbols of mediation between life, fertility, and death in Gamo society. The *degala* use the same materials (stone and cattle products) and skills (cutting and blowing) derived from their economic roles to fulfill their ethnic and regional social roles as healers, messengers, and circumcisers. The hide-workers perform *guchay*, a form of healing, for curing flesh wounds such as an abscess, insect bite, etc. The artisan is paid 1 to 3 ETB for this service or he is paid with crops. The process involves making an incision, if the wound is not open, with a razor blade but in the past with a sharp stone flake. He/she takes a bovine horn (*kula kula*) and places it on the wound and sucks through it until the horn secures on the wound. He/she leaves the horn on the wound for a sufficient time to drain the impurities, pus, infection, and/or blood. The Gamo believe that bad spirits and the breaking of *goma* (taboo) cause illness and injury. It therefore requires the intervention of a diviner (*maro*) who uses animal entrails to reveal the origin of the illness. The appropriate rituals are in order to extinguish the effects of the violation. The hide-worker's role in this respect is to rid violations associated with open wounds (referred to as*katcha,* which is also means to scrape). The word "to divine" in Gamocalay is the same word as for stone "*sucha*." In the past, the hide-workers used stone to aid in clearing the wounds. Although the *degala* do not act as diviners, they are a source for removing *goma*. The Gamo have a saying: "*maro essi ayya, degala guta kara.* " Translated it means the diviners are never

fools, the *degala*'s neighbors are strong. The understanding is that the neighbors of the *degala* are the *mala*. The impure *degala* are weak and impure constantly breaking taboos. In contrast, the *mala* are generally pure and strong. The *mala* must be strong and resist breaking taboos, because the diviners are not foolish and can find *mala* sources of breaking taboos. While the Gamo consider the *degala* to be impure; they are necessary to mediate between people and illness and infertility caused by breaking *goma* (taboos). Through *guchay*, the artisan uses his materials of stone and horn to mediate between the pure and the impure. This practice is still common today, although pharmacies and western medicines have begun to replace local healing practices.

The artisan also is obliged to blow a bovine horn, often ornamented with some leather and the tail of the animal, to announce weddings, funerals, social and political meetings (usually held to resolve local problems), and work parties (for creating new agricultural fields). The hide-workers prepare the bovine horns for this ritual use. If the artisan is requested to blow the horn within his region, he is often not paid for this work. The artisans do not mind, because "they want to get along with the people," or because they want to keep the land that the people have given them. However, they may receive 1 to 5 ETB (US $0.15 to 0.77), if they work outside their community. The latter does occur, as artisans do not live in every village and subdistrict. Again, the artisan uses products of his work, horns, to mediate between life, death, and social disharmony.

In the past, artisans also performed both male and female (clitorectomy) circumcision. The artisan received some food from the ceremony in exchange for

the operation, but in general was not paid. The hide-workers used a metal knife for circumcision. The knife could be used to circumcise more than one individual and may be in use for several years. In the distant past, stone rather than iron was used for this ceremony. The knife used for a *mala* circumcision had to be made by or reheated by a *mala* smith, although a *mana/chinasha* or *degala* artisan performs the circumcision. Both group and individual ceremonies were performed at the *mala debusha* or at the *degala debusha*. The Gamo puberty rites of passage are similar to other systems, and include a period of separation, learning, and reintegration (Van Gennep 1960). After circumcision, the household provided the initiate (referred to as *gatchino*, which means being born) with a rich diet of meat and butter, during the period of isolation. Then, boys hunted an animal and hung it outside their household, as a symbol of their ability to provide for their future family. For the next nine months, the initiate did little work and his family fed him, as he symbolically proceeded through a period of gestation. All the initiates of the *dere* demonstrated their bond between one another by using the same river to bath in. The initiates went into the largest local town presenting themselves to the community (*sofie*) wearing an ostrich feather on their heads, indicating that they were fertile and mature. Female initiates did not hunt or participate in a communal bath.

The Gamo require circumcision before an individual can produce children and before a man can become a sacrificer/leader in the community. *Degala* and *mana/chinasha* initiates are not presented in a *sofie* ceremony to the community after circumcision, which denies them their fertile citizen status within Gamo society. This reinforces societal taboos restricting sexual intercourse between *degala* and

mana/chinasha with each other and with *mala*. The implication is that any such interaction would be barren and even dangerous because wasting one's own fertility upsets the ancestors. Yet, the artisan as a dependent on others and as an impure individual orchestrates the circumcision ceremony again acting as mediator by instigating rebirth and the subsequent fertility of the initiate. During the socialist period, the national government of Ethiopia outlawed local ceremonies marking ethnicity and local identities, which undermined the artisan's role in Gamo society. Today, many people go to the several clinics scattered sparsely across Gamo territory for circumcision (male and female).

The hide-workers use the same materials (cattle by products such as horns, as well as stone) to fulfill their economic roles as leather producers to aid them in carrying out their social roles in society including healing, announcing events, and circumcision. Hence, the materials they use every day to maintain a livelihood have secondary functions within the Gamo social-economic system. Since the technology of hide-working is tied to larger social contexts, the variation in the material culture of the Gamo hide-workers may rest with the origins of caste formation within Gamo society. Among the studies of Omotic societies, there have been two proposals concerning the origins of artisans. Haberland's (1984) study of the Dizi suggests that an immigration of the Gonga people, who were descendants from northern Christian Ethiopia, came upon the Dizi and implemented their caste-structuring system on the cultivators and pastoral peoples making ethnically different groups within one dominion. In contrast, Todd (1978a) suggests that the origin of caste groups in Ethiopia is not a result of their incorporation into host societies. Todd argues that

craft specialization arises through a process of internal social differentiation. He states that smiths produced better tools, which led to a more efficient agriculture that in turn enabled the population to support fulltime smiths. Pastoralism and hunting provided many skins, and the need for skin shields to protect the chief led to specialized hide-workers. In essence, Todd advocates that the development of an internal surplus led to the creation of specialization and social differentiation. Oral histories and future archaeological work may help to resolve whether or not Gamo craft-specialization and their associated tools result from external influences and/or internal development.

Political-ritual positions

Thirty years ago, Gamo society consisted of ten political districts (*deres*) including the Bonke, Borada, Dita, Doko, Dorze, Kamba, Kogo, Ganta, Ochollo, and Zada (Figure 3-3). Each *dere* is separated from its neighbor by a river or mountain ridge. These areas are not typically inhabited and are considered the locations for the ancestral spirits (Cartledge 1995:140). In 1976, the Ethiopian government reorganized *deres* into peasant associations and local administrative regions, *awardjas*, to include DitaDaromalo (a combination of the Gamo Dita *dere* and two other ethnic groups Daro and Malo), Kamba, Bonke, Borada-Abaya, Chencha (Doko, Dorze, and, Kogo), and Arba Minch (Ganta and Ochollo). Since the inception of the new Ethiopian government in 1990, the Gamo people have worked to reinstate their traditional political/ritual structure, which the socialist government forbade. Today the Ethiopian national government considers the Gamo people part

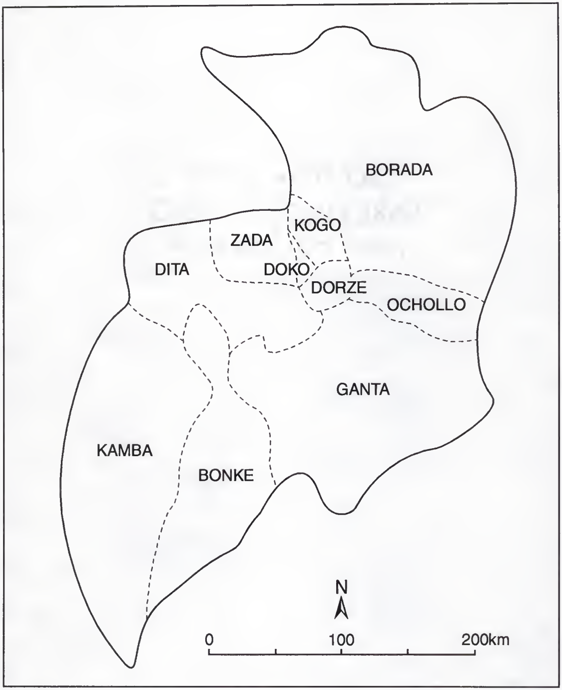


Figure 3-3: Map of the Gamo *deres* /districts.

of the North Omo administrative region of the Southern Nations, Nationalities, and Peoples Region of Ethiopia, with Arba Minch serving as the administrative center.

Hereditary positions. Each *dere* is governed by an elected assemblage of dignitaries (*dulata*) and a *Kao* who performs ritual sacrifices for the ancestors (Abeles 1978; Bureau 1978). The *Kao* does not hold final authority, but holds sacrifices (sprinkling wheat beer and honey and slaughtering an animal) to appease the ancestors to ensure plant growth and the continuity of human society (Abeles 1979; Lange 1982; Strecker 1990). This dual system is characteristic of Omotic societies (Feyissa 1997; Lange 1982; Strecker 1990). The position of *Kao* is hereditary within each *dere*, with a different clan name associated with each *Kao*. Each *Kao* has his own prescriptions, which are passed down from his father, concerning their ritual power to perform sacrifices and protect the community against harm (Abeles 1981). In general, only male citizens (*mala*) may occupy sacrificial and dignitary positions, while women and noncitizens (*tsoma*) are excluded. Although previous researchers often translate the position of *Kao* as king, this usage is inappropriate (Abeles 1981; Bureau 1979; Straube 1957, 1963:381). Past warfare between different *deres* indicates that the losing *dere* did not relinquish their land or ritual-political leaders, instead labor was demanded (Abeles 1979; Olmstead 1972). There is a contradiction between this tendency toward a centralized hegemony and respect of the local political districts demonstrating

The Gamo artisans do not serve as ritual-sacrificers, however they do play important roles in the installation of a new Kao and in the origin stories associated with the first ritual-sacrificer. At the installation of the *Kao,* the artisans (sometimes

hide-workers) place a silver ring on the *Kao* and announce the name of the *Kao* to the people (Olmstead 1997:72). In the oral traditions among the Omotic societies of Seka, Kafa, and Wolayta, the future ruler/ritual sacrificer often has the original status of an occupational group member such as potter, grass cutter, slave, or hunter (Lange 1976). This undermines the concept of an individual co-opting all power in society. Lange (1976) suggests that this indicates a period when society was more democratic and that a leader must incorporate all segments of his society. Often this new ritual-sacrificer kills a man or a wild beast as a step in achieving his position, which relates to the presence of blood sacrifices at the end of the harvest season for the rejuvenation of plant and animal life. Bureau (1983) recorded a similar story among the Gamo. However, he only offers an interpretation of it in terms of its relationship to the Amhara myth of the "Death of the Serpent" and was unable to explain many of the crucial (and perhaps Omotic) aspects of the story. Sperber (1977:76-79) discusses the story's relation to Oromo myths, in terms of borrowing and mental transformations. The story demonstrates that although the Gamo artisans have a low social and economic status in society, they are integral to preserving the fertility of the community and the appeasement of the ancestors. In short, the story is as follows. A father emasculates his son and wrongly accuses him of having sex with his stepmother (incest and the breaking of taboo). The father and the wife are so poor they must sell millstones and dress in sheepskins (i.e., the boy is the son of members of the *degala* occupational caste, groundstone-makers, hide-workers, and smiths). The innocent young man leaves his father's household and meets several young women who have been left in the wilderness as a sacrifice to the snakes. The

young man kills the snakes (blood sacrifice) and becomes ritual-sacrificer (by controlling nature and demonstrating his strength). The former ritual-sacrificer hears that the young man does not have a penis and forces everyone to wash in the river, so that he can examine his new son-in-law. There the young man meets a goddess who forms him a new penis out of clay (potters and other artisans often perform circumcision and the initiates have to wash in the river as part of their rites of passage). He goes on to become a ritual-sacrificer with sons and daughters (because he is properly initiated).

In addition to the position of *Kao*, there are two other hereditary positions among the Gamo, that of *Eka* and *Maka*. The *Ekas* are ritual specialist at the neighborhood level, they have final authority on questions regarding traditional laws, and they perform sacrifices (Cartledge 1995:98-99). Some Gamo *dere*s also will have *Makas*, who are also ritual leaders that act on a higher level than the *Ekas*.

Elected positions. In contrast to the social positions discussed above, the *Dana, Uduga*, and *Halaka* are elected positions with decision-making power on the *dere* (district), *mota* (subdistrict), and *guta* (village) levels, respectively (Abeles 1978; Cartledge 1995). As previously stated, Bureau (1979) suggests that these positions have Amhara origins. Usually these individuals are men, who: 1) do not have a surviving father; 2) must be circumcised and married; 3) have no physical deformities; and 4) are fairly wealthy, as several feasts are required which serve to redistribute resources (Cartledge 1995:81-98; Halprin and Olmstead 1976). Those contributing to the feasts with gifts called *woitho* are drawn from patrilineal kin and neighboring friends (Halprin and Olmstead 1976). Attaining the position of *Dana*,

Uduga, or *Halaka* is referred to by their people as catching (*Halaka aikos*). This demonstrates the reluctance of the individual to redistribute their resources through feasts. During the rituals involved in their installations, they provide feasts and the people believe they positively affect the fertility of the *dere* and refer to the *Halaka* as the *dere*'s wife (Freeman 1997). Hence, the people catch not only material resources but symbolic fertility. The installation rituals involve the sacrificing of a black lamb, which the hide-workers make into a cape for the initiate (Cartledge 1995:81-98). The local smiths make ceremonial staffs and the hide-workers announce the presence of the new *Dana*, *Uduga*, and *Halaka*.

Artisan political roles. The *mala* do not allow the artisans to participate in *mala* community assemblies or to hold any of the political-ritual positions such as *Kao*, *Dana*, *Maka*, or *Uduga*, because of their association with impurity. However, some *degala* and *mana/chinasha* have their own separate *debusha* (meeting places) and *Halaka*s (local leaders) to resolve *degala* and *mana/chinasha* community issues. Although among the *mala*, the position of *Halaka* usually represents the village community, the Gamo *degala* tend to have, if any, one *Halaka* per *dere*. The *mala* people state that the *degala* do not have a true *Halaka* because the *degala Halaka* does not go through *sofie* (public presentation). Also in contrast to the *mala Halaka,* who holds two feasts at the same time, the *degala* cannot afford this and so they have the feasts at two different times. The first feast is called the "Father's Feeding" and it is just for men and is held during the month of Ter (January 9 to February 7) at the initiate's house. The second feast is for everyone after Easter and is referred to as "Mother's Feeding." The *degala* must collect these resources through their *mayla*

(patron-client) relationship with the *mala*. The *degala Halaka* must be the *baira* (elder) of his segmentary lineage and have no married daughters. If an individual has no married daughters, he is not giving away any of his fertility. *Degala Halakas* are elected every 1 to 3 years. After the feasts, the *Halaka* participates in no work for nine months. The Gamo believe he is symbolically passing through gestation to be reborn (Freeman 1997). During this time the *degala Halakas* have no responsibilities. The *degala Halaka* like the *mala Halaka*, does not cut his hair, wears a sheep skin cape (*zito*), and carries the staff (*horoso*). However unlike the *mala Halaka*, the *degala Halaka* is not presented to the people in the market place (*sofie*). Since the *degala* do not go through *sofie* or public recognition, they never become full members of Gamo society and their submerged social status is maintained. However, after the nine months have passed, the *degala Halaka* becomes a full elder in *degala* society, and he can sacrifice and pray for his people, arrange marriages, and help solve problems.

The three Gamo subregions

The Gamo recognize differences between three subregions of their territory, south, central, and north. The presence of the three Gamo subregions and their relationships with one another may be important for assessing the distribution and types of hide-working material culture (discussed in Chapter 5). The people who occupy the northern and southern extremes of the Gamo territory, including the Ochollo, Borada, Ganta, Kamba, and Bonke people, view themselves as belonging to the Gamo ethnic group, but still insist that they were different from the true "Gamo." They referred to the true "Gamo" as the Doko, Kogo, Zada, Dorze, and Dita people,

who occupy the central highland region of the Gamo territory. Each subregion is different in terms of types of local ritual-political leaders and the social roles of artisans, which is discussed below.

The southern Gamo, including the Ganta, Bonke, and Kamba, have one of each type of political leader in each *dere* (Table 3-1). However, they lack the position of *Maka,* which is known in the other two Gamo regions. The southern region also uses the word *Maga* instead of *Halaka* to describe the ritual-political position at the village level. Among the southern Gamo, the potters (generally women) and hide-workers (generally male) both belong to the caste group, *mana/chinasha*, and marry one another. The southern Gamo hide-workers are responsible for circumcision, healing, and announcements, and they have *Halakas*.

Ochollo and Borada are considered northern Gamo because of their shared cultural traits, even though geographically the Ochollo are located in the central area just to the south of Borada. However, the Ochollo people are the only centrally located Gamo people who claim that their ancestors came from the north. The northern Gamo region *deres* do not have the *Uduga* position or *degala* or *mana/chinasha Halakas*. Instead, each *dere* has one *Kao,* one *Dana*, one *Maka*, and several *mala Halakas* (Table 3-2). Among the northern Gamo, the potters and hide-workers belong to different caste groups, *mana/chinasha* and *degala* respectively. Although women are generally potters and men hide-workers, groundstone-makers, and smiths, *mana/chinasha* and *degala* do not marry. In this instance, there is one sex in each caste group who is not an artisan. Among the northern Gamo, the

mana/chinasha rather than the *degala*, are responsible for circumcisions, healing, and announcing ceremonies and meetings.

Table 3-1: Gamo subregions and the number of persons holding the different ritual-political positions in each.

Region	***deres***	***Kao***	***Dana***	***Maka***	***Uduga***	***Halaka /Maga***	***degala & or mana Halaka/Maga***
South	**Ganta**	1	1	0	1	several	several
	Bonke	1	1	0	1	several	several
	Kamba	1	1	0	1	several	several
Central	**Doko**	1	0	1	1	14	1
	Dorze	1	0	2	0	7	1
	Dita	1	5	0	1	several	several
	Kogo	1	2	1	3	several	4
	Zada	1	5	0	0	several	several
North	**Borada**	1	1	1	0	several	0
	Ochollo	1	1	1	0	several	0

Table 3-2: The subregional roles of artisans.

	South	**Central**	**North**
Hide-workers and potters belong to the same caste	yes	no	no
Hide-workers as circumcizers, healers, and Musicians	yes	yes	No
Artisan *Halakas*	yes	yes	No
Artisans Intermarriage	With central	With south & north	With central

The central Gamo share cultural traits with both their southern and northern Gamo neighbors (Figure 3-3). The *deres* (districts) of the central Gamo region consisting of the Doko, Kogo, Zada, Dorze, and Dita have a mixture of political leaders, some do not have a *Maka* like the northern Gamo, and some have an *Uduga*

like the southern Gamo. This suggests an influence of both northern and southern traditions onto the central region. The central Gamo are similar to the northern Gamo in that the hide-workers and potters represent different two different caste groups. However, the central hide-workers are similar to the southern hide-workers because they both perform circumcision, healing, work as musicians, and they have *Halakas* (local leaders). The central Gamo *deres* each have a different number of *degala Halakas*. The *deres* of Doko and Dorze each have one *degala Halaka*. Within Kogo there are several *degala Halaka* positions so that Tsula, Birbir, and Dere Chencha each have a *degala Halaka* and Ezo has two *degala* Halakas. The geographical location of the central Gamo people gives them proximity and easy means of interaction and communication with both the southern and northern Gamo. Interaction with the northern and southern regions has resulted in shared ideals concerning ritual leaders and artisans' roles.

Caste, *dere* (district), and subregional membership are important identities in the lives of the Gamo hide-workers. Within the Omotic socio-political structure, the farmers consider the hide-workers as polluted and as a lower social group. They are restricted from eating, living, and reproducing with other members of their society. They have no say in local assemblages through which labor, land, and resources of the community are controlled. Yet, paradoxically the hide-workers hold important social-ritual roles as healers, circumcizers, and messengers, which connect them to the fertility of the community. The Omotic systems of socio-political relationships suggest that there are many avenues to explore relating variation in social group membership to stone tool similarities and differences (i.e., style).

Intraethnic Kinship Identities

The Gamo share a social organization with other Omotic societies characterized by patrilineal clans with virilocal postmarital residence (Cartledge 1995:39; Donham 1985:72-95; Olmstead 1974a:3; Orent 1969:97-108, Strecker 1990; Yintso 1995:23-25). As mentioned in the section above concerning caste groups, the stratified social relationships in Gamo society, i.e., membership as *mala*, *mana/chinasha*, or *degala*, are ascribed through patrilineal descent. The Gamo have over 40 different clan names, and most are represented in all three stratified groups. Hence, *degala*, *mana/chinasha*, and *mala* do not have distinct clan memberships. For example, the clan Zutuma may have members who are *degala*, *mana/chinasha,* and *mala*, as well there is no marriage between these three caste groups or between clan members.

Mala (farmer and citizen) oral history states that the artisans arrived in the area after the farmers. Thus, the artisans had no land and were indentured to the farmers for food and land. When the farmers gave the artisans land to live on, the artisans took the clan name of their patrons. This explains the presence of the same clan names for artisans and farmers, and the low social position of artisans. This is realized in two of the villages I studied in-depth, Mogesa and Patela. In these villages, the hide-workers' households are located closest to *mala* households that share the same clan name, and claim their original patron.

When I questioned the hide-workers about their origins and their first ancestor, they recounted the following verse for me*: !Kaysay Dara Degala Asha.* Literally translated, this phrase states; wealthy (*dara*) priest (*!kaysay*), protect me

(*asha*) the impure (*degala*). So the verse describing the first *degala* individual places him in his subservient social and economic position within Gamo society through his name (i.e., protect me). It also places him in juxtaposition to a pure and wealthy individual insinuating that the *degala* is neither pure nor wealthy. Ideologically this restricts any inherent right to resources, and reinforces the patron-client (*mayla*) relationship. The ancestral symbols of the *degala* bolster their social and economic roles in society. In addition, within each caste group, membership in a moiety, clan, lineage, and domestic group is important for social identity. The following discusses the Gamo hide-workers' kinship relationships in terms of moieties, clans, lineages, and domestic groups.

Moiety

A dual division segregating clans based upon the presence of an indigenous population and a later intrusive group is commonly found in Omotic cultures such as the Ari, Hamar, Skekacho, Kore (Straube 1963), Male (Donham 1985), and Kafa (Orent 1969:97-108, 1970). Straube (1963) points toward the Nilotic culture as introducing the moiety system to southern Omotic cultures. Orent (1970) argues that a true moiety system never existed in southwestern Ethiopia because they are generally associated with bifurcating merging kinship systems, which operate to separate the mother's and father's lineages (Lowie 1928; Murdock 1947).

Gamo society is partially a generational system with the same terms applied to one's father's and mother's parents (*myza*) and grandparents (myaye). However, the Gamo refer to their father's brothers and their sons as brothers (*isha*). Father's brothers' daughters are referred to as sisters (*miccho*). Members of these generations

outside their patrilineage are not referred to as brother and sister. Despite the absence of a true bifurcate merging system in Gamo society, there is a hint of a former moiety system in which they divide clans into two groups *mala* and *dogala*. It should be made clear that *mala* clans are not clans in which only *mala* as a social hierarchy belong, but *degala* and *mana/chinasha* also are members. The *mala* clans consist of all clan names with the suffix "*mala.* " Tradition states that they arrived to the region after the *dogala* people. The prefix often denotes the place of origin for *mala* clans: such as <u>Wolayta</u>mala and <u>Daro</u>mala that indicate origins in other Omotic societies. *Dogala* clans lack the "*mala*" suffix and the Gamo believe they are the original inhabitants of the Gamo region. *Dogala* clans incorporate all other clan names including: Zutuma, Masha, Maka, and Goodara, etc. For this reason, the Gamo believe that the *dogala* clans represent individuals, who always lived in the Gamo highlands, while *mala* clan individuals moved in from other areas. There is one exception to this dual division of clans, the presence of the Amara clan. Individuals belonging to the Amara clan are descendants of the Amhara soldiers/settlers, who invaded during the 16th century. This study of hide-workers indicates their membership in 32 of the approximately 40-clan names among the Gamo.

Marriage patterns among the Gamo are important for determining the extension of their access to resources outside their own village. Although the Gamo practice polygny, the hide-workers are not wealthy enough to have more than one wife. The hide-workers belong to both the *dogala* and *mala* moieties. There is no geographic distinction of *dogala* and *mala* clans in the Gamo region; rather there is a

mixture of *dogala* and *mala* clans in each *dere*. This is important because it allows individuals to marry within their *dere* to someone of the opposite moiety (see Appendix Table B-1). My kinship study confirms that most hide-workers marry individuals within their own *dere* (Table 3-3). However, in the past, the central Gamo hide-workers of Doko, Dorze, Zada, and Kogo tended to more frequently marry outside their *dere* to women from the lowland/northern region (Table 3-3). Among the northern Borada hide-workers, there has been a consistent marriage pattern within the area both in the past and in the present. I do not have much information regarding the kinship patterns of the southern Gamo, but all individuals I interviewed married within the region, both in past generations and present.

Table 3-3: Past and present *dere* and subregional marriage patterns among hide-workers.

Region	***Dere***	**Living: Spouse from same *Dere***	**Deceased: Spouse from same *Dere***
NORTH	Borada (n=86)	74%	70%
NORTH	Ochollo (n=10)	40%	47%
CENTRAL	Doko (n=100)	73%	60%
CENTRAL	Dorze (n=49)	72%	45%
CENTRAL	Kogo (n=225)	60%	40%
CENTRAL	Zada (n=100)	47%	40%
SOUTH	Bonke (n=7)	100%	100%

Elders frequently stated that in the past *mala* and *dogala* individuals had to marry persons belonging to the opposite moiety. Kinship and clan information from my survey indicates that today 47 percent (159 of 335) of the hide-workers married women within the same moiety; one generation back this same figure was 39 percent. My study of Gamo marriage practices in the villages of Mogesa Shongalay,

Eeyahoo Shongalay, Amure Dembe Chileshe, and Patela Tsela is summarized in Table 3-4. It indicates that the marriage pattern between moieties generally holds true. The Mogesa Shongalay hide-workers belong to the Gezemala clan of the *mala* moiety and married women of the *dogala* moiety. In the village of Patela Tsela, the hide-workers belong to the Zutuma clan of the *dogala* moiety and marry women of the Amara clan and of the *mala* moiety clans. The Amara are not considered members of the *dogala* or the *mala*, as they represent a population descended from or enslaved to the Amhara invaders in the late nineteenth century. Two different clans represent the Eeyahoo Shongalay hide-workers: Gezemala and Bolosa. The Gezemala hide-worker married a woman of his same clan, Gezemala. This is extremely rare[1]. However, the *dogala* Bolosa individuals married into the *mala* clan. The only village, which did not fit this moiety pattern, was Amure Dembe Chileshe where hide-workers belong to the Maagata clan of the *dogala* moiety and marry women mostly from the same moiety.

Among the hide-workers living in Borada, Kogo, Doko, Dorze, Zada, and Ochollo, there are fewer living hide-workers who belong to the *mala* moiety (37 percent n=206) than the *dogala* moiety (63 percent n=347). Since the Gamo perceive the members of the *dogala* moiety as the original inhabitants of the Gamo territory, they may own more land and wealth than people of the *mala* moiety. If the latter were true, the *dogala* would have been in a better position to offer land-labor exchange relationships with artisans, thus creating more artisans in the *dogala* moiety. If *mala* individuals are migrants from other areas, it is likely that they would

[1]. He actually gave a different clan name for his wife, but I know the patrilineage she is from and knew the correct clan name.

be more restricted in the types of resources available to them, which might create differences in *mala* and *dogala* stone tools. Since the clans of the *mala* moiety are considered foreigners, there may be little communication and transmission of ideas between the two moieties. Although men marry women from an opposite moiety, men learn hide-working from their fathers. Even if they obtain resources through their wives, the final products resemble their father's work rather than that of their fathers-in-law. Hence, the expected relationship is that scrapers will reflect differences in moiety membership.

Table 3-4: Cross-moiety marriage patterns for hide-workers in the villages of Mogesa, Patela, Eeyahoo, and Amure.

Village	Husband's Moiety	Husband's Clans	Wife's Moiety	Wife's Clan
Mogesa	**Mala**	Gezemala	**Dogala**	Maagata, Maka, Zutuma Damota
Patela	**Dogala**	Zutuma	**Mala** **Amara**	Dalomala, Gezemala Amara
Eeyahoo	**Mala** **Dogala**	Gezemala Bolosa	**Mala** **Mala** **Dogala**	Gezemala Gezemala Goodara
Amure	**Dogala**	Maagata	**Dogala** **Amara** **Mala**	Masha, Zutuma Zamanay, Amara, Gezemala

Clans and lineages

Generally, individuals, including hide-workers, cannot marry members of their own patrilineage or that of their mother's (Olmstead 1974a:31-32). Children take the clan name of their father, and in addition, a child's second name is the same

as the father's first name. For instance a child named Calche, whose father's first name is Buta, will be called Calche Buta. Since residential patterns are virilocal, each village consists of clusters of several segmentary lineages.

Hide-workers living in one village belong to one patrilineage, and state that their ancestors have lived in that particular village for all the generations. The men could recite back five to eight generations. In my survey of 588 living hide-workers, only 68 individuals or 12 percent have moved to another village. This contrasts with information on 555 deceased hide-workers in which only five individuals or 0.9 percent had moved to another village. In ninety-three percent of the villages, the hide-workers were members of a single lineage. Villages with two hide-worker lineages were less common at seven percent. This disputes the claim by the *mala farmers* that artisans are constant wanderers. Although some hide-workers do move, my research indicates that this is a very low percentage. Even though a low percentage of hide-workers move to a new village, it is enough to disrupt a clear association between village and clan membership (see Appendix Table B-1). In most instances, I was able to determine how segmentary lineages of hide-workers living in different villages are related to one another, and that the migration had occurred within the last thirty years with the redistribution of land. However, there are also some instances in which the relationships were too distant to be remembered. Therefore, since hide-working is learned from fathers, I expect that scraper morphology will reflect lineage and clan membership.

Among the Gamo, patrilineage and clan membership are important for access to land, ensuring the health of land, animals and people through association with the

ancestors and ritual sacrifices, and also in terms of access to political-ritual power (Donham 1985; Orent 1969:97-108; Olmstead 1974a:24-30, 1975b). Each lineage has a series of *bairas* (seniors), who perform sacrifices for other lineage members (*getha*) (Sperber 1975, 1977:59-62). *Baira* is inherited according to strict genealogical seniority. Each lineage has a senior, *omo baira*, and a household senior, *ketsa baira* (Olmstead 1974a:26). A son can only become household *baira* after his father is dead. The eldest son inherits his father's household, property, fields, and animals. He makes the sacrifices of grain and milk to the ancestors. The hide-worker's sons also inherit handles and the stone quarry. The younger sons must share the small plot of land with their elder brothers or acquire land from a patron. If the father has farmland, the younger sons will live in a household built on that land rather than next to the father's house. The father and his patrilineage are important for the transmission of information and skills related to hide-working. Younger brothers become *bairas* of their own descent groups in separate households usually after the older brother dies and his sons take over a segmented descent group. Although *baira* is usually in relationship to genealogical relationships within a clan, outside the clan relations it is based on the source of fertility. For instance, in several Omotic societies, including the Gamo, when a man and woman marry, the woman's patrilineage as the source for fertility is considered *baira* to the groom's patrilineage (Donham 1997:108; Freeman 1997; Orent 1969:158). The bride's father expects the son-in-law to help with agricultural work. Thus, the relationship involves tribute labor, as well as respect.

There is a hierarchical relationship between wife-givers and wife-takers in Gamo society, and a permanent ranking of houses/clans is possible if the women from the same house/clan always married men of the same house/clan (Donham 1990; Freeman 1997). The husband's lineage is indebted to the wife's lineage, if the union results in the birth of children. The Gamo consider the wife's lineage as the source of potential fertility, which the husband's lineage activates. Having produced descendants, the wife's lineage is revered as a fertile one, and marriage between the lineages may be repeated to reinforce the relationship. If hide-workers do marry women of the same lineage as their mothers, then they may establish a stable resource base through kinship relationships. However, my study of Gamo hide-worker kinship does not support the presence of a stable alliance system. I was able to obtain knowledge of the clan name of both the mother and wife for only 113 of the 180 hide-workers interviewed. My study indicates that 72 percent (n=81) did not marry women sharing the same patrilineage as their mother and 28 percent (n=32) did. Only 4 of 32 individuals (1.3 percent), who married women of the same clan as their mother, married them from the same lineage.

For more reliable information, I also examined this relationship in the four villages I studied in-depth, Mogesa, Eeyahoo, Patela, and Amure. These hide-workers did not marry women of their mother's patrilineage (see Appendix Table B-2). Interestingly, the hide-workers of two of the villages tended to marry women from another environmental zone. For instance, the lowland villages of Eeyahoo Shongalay and Amure Dembe Chileshe married women from the highland subdistricts of Leesha and Ezo (Figure 3-3). In addition, the marriages of the

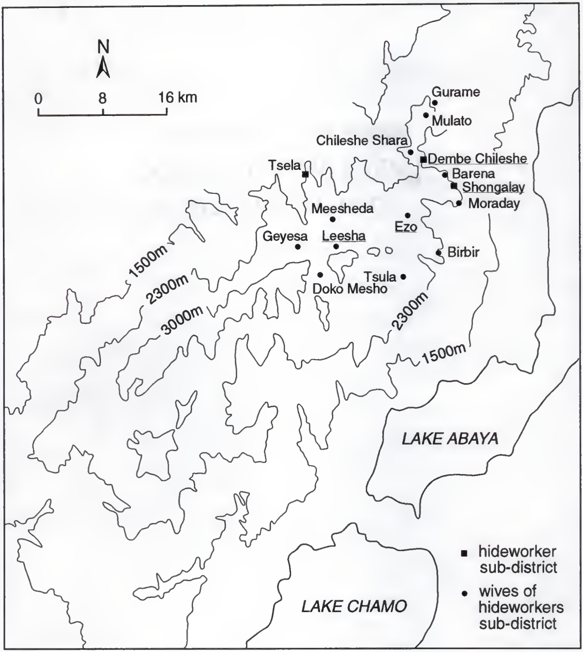


Figure 3-3: Map of *mota*/subdistricts for marriage relationships of Mogesa Shongalay, Eeyahoo Shongalay, Amure Dembe Chileshe, and Patela Tsela. Underlined names are discussed in text and the others are referred to in the Appendix Table B-2).

Eeyahoo hide-workers' sisters served to help them relocate to that village. Originally, the Eeyahoo Shongalay hide-workers are from another subdistrict and district. The sisters married *degala* from Shongalay. The fact that their sisters were married to men in the Shongalay *mota* (subdistrict) probably aided these Bolosa hide-workers in obtaining their residence in Shongalay. The other Eeyahoo hide-worker has a sister who married an Eeyahoo Shongalay smith. This sister, who lived in Eeyahoo, raised him, although he is originally from Ezo Gulay Tzabo. Thus, this study of hide-worker kinship relationships suggest that there is not a hierarchical relationship between different patrilineal clans based on wife-givers and wife-takers, since most hide-workers marry into different lineages than that of their mothers. However, hide-workers do utilize marriage relationships to gain access to land in other subregions and perhaps even hide-working resources, which I will explore in Chapter 5.

The Gamo also practice junior leveriate, referred to as *lata*. The younger brother is responsible for his older brother's wife and children, if the older brother dies. In the four villages, I have clan information for eleven sets of brothers, and of these, five married women of the same clan as their brother but from different lineages. Clearly, the Gamo practice leniency concerning marrying into the same clan as a brother, however none married the sister of their brother's wife or into the same lineage.

Domestic groups

Hide-working skills are learned within the village context through observation and direct prompting by fathers, grandfathers, uncles, cousins, and older brothers. Hide-workers begin to learn to scrape hides at twelve or thirteen years of age. When the hide-worker takes a break from scraping the hide, often his son will try to scrape the hide himself. However, they do not begin producing their own scrapers until they marry. Before this time, a young man may scrape a hide, but it is with scrapers made by his father or older brother. Since postmarital residence is virilocal, the new household is established right next to the father's. Fathers and sons travel to quarries together and the young hide-worker learns, through observation, which pieces are suitable for making scrapers. Fathers often oversee the production of scrapers by their sons, provide guidance, and even aid them in shaping and resharpening the scraper. Since sons learn the craft of hide-working from their fathers and elders, I did not expect that individual expression in the stone scrapers would be strong.

The hide-workers in the villages of Mogesa, Amure, and Patela (see Chapter 2, Figure 2-2 for map) are each members of a single patrilineage. The hide-workers living in Eeyahoo have all moved there recently from Kogo and represent two different lineages. Below I review in each of the villages, the learning relationships and years of experience for each hide-worker, to set the background information concerning the intravillage similarities and differences in handle and scraper form.

Mogesa. In Mogesa, there are three domestic and learning groups: 1) Buta, Tesfy, and Goa; 2) Mokano, Mola, and Yonja; and 3) Yeka. The Mogesa hide-

workers all belong to one clan, Gezemala, and are descendants of Gagra Cala. They live in a cluster of households on the southern edge of the village. The three eldest hide-workers Buta, Mokano, and Yeka are the descendants of three brothers (see Appendix Figure A-1 and A-2). Buta has made scrapers and scraped hides for thirty years, Mokano for twenty years, and Yeka for thirty-five years. Each of these hide-workers has a set of three *zucano* (double-hafted mastic) handles, which they share with younger members of the village.

Buta has two sons, Tesfy and Goa, whom he taught hide scraping and who use his handles (see Appendix Figure A-1). Subsequently, Tesfy has made his own scrapers starting eight years ago and Goa for two years. At the end of my stay in Mogesa, Tesfy had purchased three handles from his cousin, who no longer scraped hides. He never used these handles while I was there, preferring to continue to use his fathers.

Mokano has one son, Mola, whom he taught hide-working and with whom he shares his handles (see Appendix Figure A-2). Mola has made scrapers for five years. Mokano also taught Yonja (a cousin) how to make scrapers and scrape hides, as Yonja's father died before he had taught him. Yonja has only made scrapers for four years, and has two brothers who farm. Yeka is Yonja's uncle and Mokano is a third-cousin, yet Mokano is younger and spent the time to teach Yonja (see Appendix Figure A-3-4). Yeka, although he is older than Mokano, has no adult sons whom he has taught to scrape hides. Yeka's oldest married son chose to farm rather than scrape hides.

Amure. In Amure, there are three domestic and learning groups: 1) Gabre, Gamana, Galche, and Mardos; 2) Chamo and Hagay; and 3) Hanicha, Osha, and Bedala. The Amure hide-workers all belong to the clan Maagata descended from Yella. The two eldest living hide-workers, Hanicha and Gabre, are the descendants of two brothers, Mara Yella and Asa Yella.

Mara Yella had two sons: Maze and Goba, whose descendants form two descent and learning groups 1) Gabre, Gamana, Galche, and Mardos (see Appendix Figure A-3) and 2) Hagay and Chamo (see Appendix Figure A-4). Gabre is too old and no longer scrapes hides. He has one son, Gamana, whom he taught and who uses his handles. Gamana has been knapping for thirty-five years. Galche is Gabre's nephew. Galche learned how to make scrapers from his own father, who is now deceased, and uses his father's handles. He also learned how to make scrapers approximately five years ago. Mardos is distantly related to Gabre, Gamana, and Galche through Maze Mara, Mardos's great-great grandfather. Mardos is learning how to make scrapers from both Galche and another village hide-worker, Bedala.

Hagay and Chamo represent a second domestic group descended from Mara Yella (see Appendix Figure A-4). They are brothers who learned how to make scrapers from their father, who is deceased, and they each have their own handles. Hagay is almost blind due to an untreated eye infection, which may prove to affect his scraper production and use. Hagay has been making scrapers for at least twenty years and Chamo for about eight years.

The descendants of Asa Yella form the third domestic and learning group in Amure and include: Hanicha, Osha, and Bedala (see Appendix Figure A-5). Hanicha

has one son, Osha, whom he taught hide scraping. Osha has been making his own scrapers for seven years and uses two handles, which were his father's. Hanicha also taught his nephew, Bedala, how to make scrapers, but Bedala uses his own father's handles. Bedala has been scraping for only five years. Bedala shares handles with Mardos, though he is more closely related to Galche.

Patela. In Patela, there are five domestic and learning groups: 1) Garcho, Garafay, and Uma; 2) Darsa, Garbo, and Gaga; 3) Tsoma; 4) Gimay, Tina, and Tinko; and 5) Arka, Unkay, Abata, and Basa. The Patela hide-workers are descended from Wogaysa Lokay of the Zutuma clan. Garcho and Gimay are the oldest living hide-workers in the village; they are the descendants of two brothers, Gatelo Wogaysa and Gasamo Wogaysa. Their brother Daso Wogaysa has left a lineage with only one living direct descendant, Tsoma Conday. The Patela hide-workers each make their own handles for hafting their scrapers.

Gatelo Wogaysa had two sons, Gaso and Galgo, whose descendants form two domestic groups: 1) Garcho, Garafay, and Uma and 2) Darsa, Garbo and Gaga (see Appendix Figure A-6). Garcho no longer scrapes hides but is still making scrapers for one of his sons, Garafay. Garafay is learning how to scrape, but does not yet know how to make scrapers. Garcho also taught his elder son Uma, how to knap three years ago. Darsa, Garbo, and Gaga are brothers, who are distantly related to Garcho and Uma. Darsa and Garbo learned to scrape hides from their father who is now deceased. Gaga is learning to knap from Darsa. Darsa has been knapping for approximately twenty years, Garbo for nine years, and Gaga for three years.

As stated above, Daso Wogaysa has only one direct living male descendant, Tsoma Conday (see Appendix Figure A-7). Tsoma learned how to make scrapers from his father, who is now deceased. Tsoma has been knapping for six years.

Gasamo Wogaysa had two sons, Gaza and Gelo, whose descendants form two domestic groups: 1) Gimay, Tina, and Tinko (see Appendix Figure A-8) and 2) Unkay, Arka, Abata, and Basa (see Appendix Figure A-9). Gimay no longer produces scrapers or scrapes hides. Gimay has two sons, Tina and Tinko, whom he taught the craft. Tina had been knapping for twelve years and Tinko for seven years. Arka and Unkay are brothers, who learned how to scrape hides from their father, who is now deceased. Arka has been making scrapers for approximately thirty years and Unkay for nine years. Arka has one son, Abata, and a cousin, Basa, whom he taught how to scrape hides. Abata has been knapping for three years and Basa for ten years.

Eeyahoo. In Eeyahoo, there are two lineages of hide-workers 1) Amaylo and Awesto and 2) Arka. As stated previously, the three hide-workers living in Eeyahoo recently moved there from Ezo and do not live close to one another. In addition, each of these individuals makes his own handle rather than inheriting the handle of his father. Amaylo and Awesto are brothers, who moved to Eeyahoo from Ezo Waro (see Appendix Figure A-3-10). Amaylo (in his late 20s) learned to make scrapers approximately nine years ago from his father. Awesto learned to make scrapers from his father approximately seven years ago. A third hide-worker living in Eeyahoo is Arba, who also is in his early twenties. Arba learned hide-working from his father, who lived in Ezo Gulay and who is now deceased (see Appendix Figure A-11).

Although detailed, the learning and domestic relationships, as well as the hide-working experience of individuals living in the four villages provides a basis for understanding learning groups, spatial analysis, and variation in intravillage scraper morphology. Understanding the years of experience and ages of the hide-workers may also be valuable when deciphering standardization in form and breakage rates of scrapers.

Before my own research there was no evidence concerning Ethiopian or Gamo artisan kinship relationships, inheritance, and residence patterns. Establishing these types of social relationships is important for attempting to understand learning groups and the transfer of material culture and resources through different generations. The Gamo are a patrilineal virilocal society whose social relationships depend strongly on their "brothers" or "*ishas*" within the moiety-clan kinship organization. Even within their kinship lineage, the ancestral symbols of *degala* and *mala* are contrasted, reminding the artisans of their subservient social and economic roles within the wider Gamo society. In essence, because of the combined prohibitions on marriage between *mala*, *mana/chinasha*, and *degala* and the *goma* (taboos), which prevent *degala* from farming fields as sources of pollution, individuals are locked into occupational groups. The Gamo hide-workers learn their craft from their fathers and so their associated material culture should reflect their membership in patrilineal descent groups, including moieties, clans, lineages, and domestic groups.

In summary, this section has reviewed the Gamo social relationships including interethnic, intraethnic socio-political (caste, *dere*, subregion), and kinship

(moiety, clans, lineages, and individual) relationships. Among the Gamo, there are many avenues to explore relating stone tool variation to social relationships. The Gamo place importance on their membership within an ethnic group, as well as their membership in particular castes, political districts, subregions, moieties, clans, lineages, and domestic groups. My hypothesis is that stone tool variation also will reflect these identities, which will be tested in Chapters 5, 6, and 7.

Discussion

This review of Gamo economic, social, and political life provides the background information necessary for assessing variation in the hide-workers' stone tools in the following chapters. As members of a caste group in Gamo society, the hide-workers are limited in their access to specific types of material culture, stones and hides, which are otherwise discarded or ignored by the rest of Gamo society. Yet, the hide-workers use these products to make items useful to the rest of society, and they use them in their mediating social roles as circumcisers, messengers, and healers. Where they live and their social-political relationships (i.e., political districts and subregion) determine the types of stone, hides, and wood used in their practices. They learn hide-working from their fathers and membership in a particular moiety, clan, and lineage is significantly important to them. Hence, there are multiple issues to investigate concerning the social and economic representations behind stone tool variation among the Gamo.

CHAPTER 4
REGIONAL RESOURCE AVAILABILITY: THE EFFECT ON GAMO HIDE-WORKING PRACTICES AND MATERIAL CULTURE

Many archaeologists believe that stone tool variation is the result of dissimilarity in procurement strategies and the activities in which tools are used, which in turn are spurred by differences in environment and resources (Ammerman and Feldman 1974; Binford 1962; Dunnell 1978; Mellars 1970; Odell 1981; Shott 1989). Gamo stone tools seemingly are used for only one function—to scrape cattle hides. Yet, the Gamo live in diverse lowland and highland environments to the west of Lakes Abaya and Chamo. This diversity in Gamo geography presents avenues for variation in the Gamo hide-working process. This chapter examines regional patterns in Gamo hide-working, including: 1) the types of raw material resources available (obsidian, chert, glass, and iron); 2) procurement strategies (indirect and direct); 3) available technologies (direct percussion with different sized iron billets); 4) arboreal resources for hafting (highland and lowland); 5) tool flexibility and versatility (use on highland and lowland hides); 6) time allocation (differences in the reduction of hide thickness); 7) different activities used to reduce the hides (scraping and chopping); and 8) uselife, longevity or curation (changes from blanks, unused and used-up scrapers). The analysis of the Gamo scrapers indicates that there are discernable differences in stone tools based on different activities.

Hide-Working Technology

Stone Procurement and Scraper Production

Each Gamo hide-worker procures his own raw material, produces his own scrapers, and uses his own scrapers. The stone scrapers have no secondary uses, though I occasionally saw children playing with discarded scrapers. Sometimes individuals who share handles (such as fathers, sons, uncles, and nephews) will use a scraper that is already hafted and has been partially used by another individual. Furthermore, younger and less proficient individuals will seek help in shaping and resharpening scrapers from older and more experienced hide-workers. Shaped scrapers are not sold or traded at markets, but stay within village use.

The Gamo hide-workers use iron, glass, chert, quartzite, and obsidian to scrape hides. The Ganta and Kamba hide-workers use iron (Figure 4-1), although some Ganta hide-workers also use glass and some Kamba hide-workers use chert. Currently the Dorze, Doko, Dita, Kogo, and Zada hide-workers predominately use glass. Among the Gamo (not including those who use iron), approximately 70 percent of hide-workers are using glass, while only 30 percent are using stone exclusively. The hide-workers prefer Ambo (mineral water bottles) or alcohol bottle glass. Glass was introduced into the south during the Italian occupation of Ethiopia (1935 to 1941), but its use among hide-workers did not become prevalent until the socialist government. As previously discussed, since the onset of the socialist government in Ethiopia circa 1974, hide-working is in less demand because of an increased presence of western

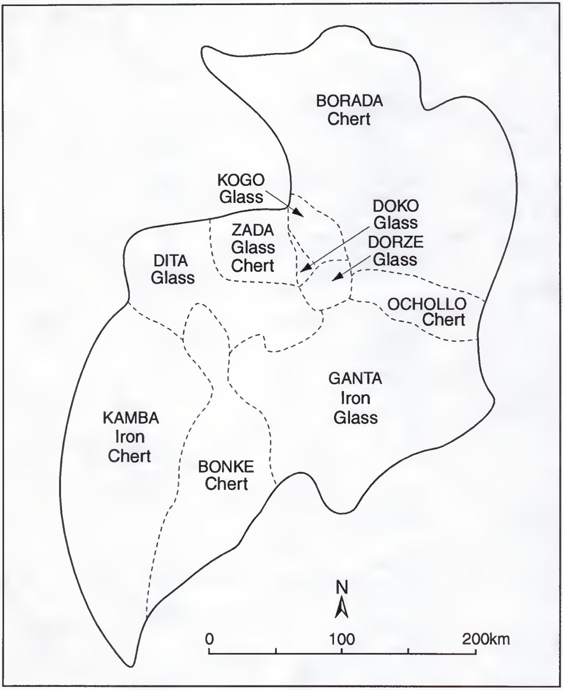


Figure 4-1: Map of the Gamo territory indicating the types of scraping materials used in each political district (*dere*).

goods and the redistribution of land. The hide-workers who use glass state that they prefer to use stone because it does not tear the hides as easily. However, they use glass because it is easier to obtain and it is no longer worth their effort to travel long distances to procure stone resources because of the reduction in demand for scraped hides. Glass is replacing chert and obsidian more quickly in areas where hide-workers had obtained stone through the market system. Only one man in Kogo used quartzite, because he can no longer purchase chert at the markets with the drop in demand. He is an elderly man, who seldom goes to the market and lives within a 15-minute walk of the quartzite source. The source is very small and the other local hide-workers claim that the quartzite is very poor for achieving a sharp edge and so they would rather use glass than quartzite.

Thirty years ago the Doko, Dita, Kogo, and Zada hide-workers obtained stone at the Kogo Ezo market. Birbir hide-workers brought the chert to sell at the Ezo market. Today, a few hide-workers still purchase chert at the market, and it costs 3 ETB for one chunk, approximately 15 by 15 cm in size. In contrast, bottle glass costs them nothing as they simply pick up pieces of broken glass that they see on the ground, especially in the town areas, where the markets are located. Hide-workers usually visit the markets that are reachable in a day. However, they will stay the night with local *degala* if the market is too far for return in one day. The major Gamo markets are located in the towns of Bonke, Belta, Kamba, Arba Minch, Bodo (Dorze), Tuka (Chencha town), Hamusa (Ezo), Pango (Doko Mesho), Zada, Dita, Kodo, Wacha (in Kucha), Wadjifo, Chileshe (Sayno), and Zephene (Figure 4-2). The markets have

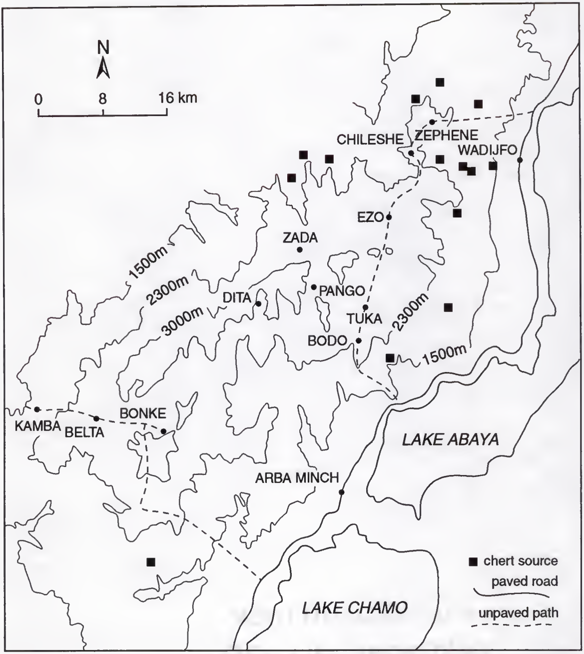


Figure 4-2: Map locating the Gamo markets and chert sources.

an average distance of 7.5 km between them (Forester, 1969; Jackson et al. 1969; Jackson 1971).

Currently the hide-workers who collect their own chert directly from the source do not pay anyone for it. Although in Dorze, Kogo, and Zada there are hide-workers who continue to use chert (usually elderly hide-workers who live close to a source), it is the hide-workers in Ochollo, Bonke, and Borada who use chert and obsidian to the exclusion of glass for their scrapers (Figure 4-2). The latter live within a one to six-hour walk of their source. The Ochollo use a source located on the Baso River, approximately a two to three-hour walk (Dabay and Daho). There is also only one known source in southern Bonke at Zargola that is used by all the Bonke hide-workers. In contrast, there are many sources of chert in Borada (e.g., Bobay, Bookaria, Cara, Chilamany River, Derara, Dugana, Godaro, Gonkelyo, Guyo, Halay Mountain, Losamay River, Olay, Shalatalo, Shorto, and Tuscgamo) and the hide-workers collect it themselves. In the past, obsidian was traded down from Wolayta through the market systems, and today those who use obsidian find it in agricultural fields that are likely archaeological sites[1].

Three of the villages I studied in-depth are located in Borada and one in Zada (see Chapter 2, Figure 2-2). The Mogesa, Amure, and Patela hide-workers use sources exploited by their ancestors, which they do not share with others. The Mogesa Borada hide-workers have two chert sources located along the Kendala River, Olay and Derara, which are within a ten minute walk from one another along the same river branch. The Amure Borada hide-workers procure stone from two chert sources, Guyo

[1] Unfortunately, there have been no geological surveys in the region for sources of chert and obsidian.

and Tuscgamo, along the Bobe River. In Eeyahoo Borada, the hide-workers use two different sources. Until thirty to forty years ago, there were no hide-workers living in Eeyahoo. The first hide-worker to move to Eeyahoo Borada discovered his own source of chert but refused to share it with the other hide-workers who later moved into the village. This is common, as in all the villages I visited the hide-workers stated that they did not and would not share their stone quarry with others. One of the hide-workers, who moved to Eeyahoo circa nine years ago, searched the area and found his own source, which he now shares with his brother and another hide-worker. This source is on a branch of the Etolo River, called Shorto. As far as they know, no else uses the source. The Patela Zada hide-workers obtain their chert from a source in Kucha called Godaro located on a branch of the Guzeme River.

The hide-workers go to the quarry after it rains and search the riverbanks for a suitable piece of material by simply walking along the streambed and up the sides of the riverbank. Pieces of raw material or nodules range in size from 10 by 10 cm to 40 by 40 cm. The large pieces are broken, using several methods. Some hide-workers break up the nodules by placing large rocks underneath for balance and stability. They throw a larger rock on it from a standing position. Others sit on the ground with the raw material on the ground between the legs and, taking a large rock in both hands, hit the raw material to break it up. Hide-workers also use the bottom edge of a large iron hoe/iron billet to strike at the raw material, usually along an edge where there is exposed chert. The large iron billets average 25 to 30 cm in length, 6 to 10 cm in width, and 1 to 7 cm in thickness (distal to proximal end). Once the piece is small enough to easily hold in the hand (approximately 12 by 12-cm), the hide-worker uses a

smaller iron billet to remove flakes for potential scrapers either at the quarry or at the household. Each individual has his own small shaping/sharpening iron billet; the average size is 12.5 cm in length, 5 cm in breadth, and 0.35 cm in distal thickness (Figure 4-3). Often the hide-worker strikes lightly at the edge, preparing the platform for removal of the flake. Continued percussion flaking from the nodule in multiple directions removes the flakes. The hide-workers select flakes that will not break easily (i.e., are not too thin) and have little patina or cortex (which makes for a dull edge), but which they believe has an edge which is sharp (i.e., thin) enough to scrape a hide. They usually select two to three flakes from a nodule as good.

Some of the hide-workers rotate the flake between their fingers shaping all edges, while others do very little shaping of the scraper. If the flake is shaped, it is held with the dorsal side to the palm of the hand and the thumb over the ventral side. They use the flattened end of a small iron billet to reduce the flake, shaping and/or sharpening it into a scraper through direct percussion. Generally by the time the blank is shaped there is virtually no sign of the original platform, which is usually shattered on impact. I did not attempt to count, measure, or collect production waste materials; this is itself a project that would require fulltime research. The average nodule kept in a household cache is six by 5 cm in size. The average number of flakes or blanks discovered in the caches was eleven, with a range from one to thirty-five.

The Gamo hide-workers refer to chert as *goshay* and obsidian as *salloa*. The word for stone in Gamocalay is *sucha*, so goshay is a unique name applied by the hide-workers to the stones they use to scrape hides. They do not have distinct names for cores and blanks, but simply referred them as *goshay* or *salloa*. However,

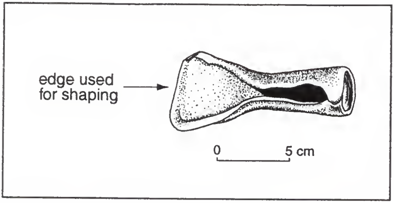


Figure 4-3: Illustration of a Gamo iron billet used to shape stone tools.

unused scrapers were called *oratay* (young or new) *goshay* and used-up scrapers *chima* (old or wise) *goshay*. They may also refer to the resharpening waste and production waste as *chancha* and to producing scrapers as *tekata*. To put a scraper in a haft is referred to as *wotza*. These words have no other meaning in Gamocalay.

They have specific names for the different parts of the scraper, as illustrated below (Figure 4-4). The dorsal side is referred to as the back (*zoco*), the ventral side as stomach (*ulo*), the laterals as the sides (*gata*), the proximal as the anus (*dulea*), and the working edge as the eye (*iffee*). That human body parts are ascribed to the scraper is interesting in light of the hide-workers' role as mediators of life and fertility in Gamo society. The hide-workers perform circumcision (referred to as *katsaro*) on the Gamo people, which makes them fertile and adult members of society. In the past, circumcision was performed using a stone knife, but today they use iron. Similarly, the hide-worker through his shaping and use of stone to scrape the hide (*katcha*) renders the stone into an effective/fertile tool.

Hafting

The Gamo hide-workers use two different handle types to haft their stone tools for scraping hides. As previously stated in Chapter 1, some of the Gamo people today use a *zucano* handle with a carved central opening in a thick piece of wood forming an open oval shaped handle (Figure 4-5). The handle accommodates one scraper on either side. Tree resin holds the scraper in the closed-socket. The hide-workers collect mastic from the tree using a thin stick to dig it out of the trunk. They heat the mastic in a broken piece of pottery in an open field. When initially heated the resin

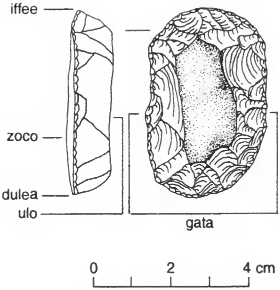


Figure 4-4: Illustration of a Gamo scraper with emic names.

sparks and could catch a thatched roof on fire, and so mastic is not made within the household. The hide-worker uses a stick to place the resin in the socket. The mastic is made malleable by heating it next to a hearth, and then the scraper is inserted and adjusted to the proper angle (~ 90 degrees to the haft) for scraping. The Gamo also use another handle type for scraping hides, referred to as a *tutuma*. It is a tubular-shaped piece of wood, which is split open in one end to accommodate a single scraper. The end of the scraper is wrapped in a piece of cloth or hide shaving or wedged with a piece of wood and inserted into the split end of a wooden handle. Rope rather than mastic is used to secure the scraper into the open-socket (~90 degrees to the haft).

Each of the three Gamo subregions (north, central, and south) uses different handle types. The southernmost Gamo regions (Kamba, Bonke, and Ganta) have only used the *tutuma* handle (Figure 4-6). This handle type was used to scrape cattle, sheep, and goat hides. In contrast, in the northern region (Borada and Ochollo) the hide-workers used only a *zucano* handle in the past to scrape cattle, sheep, and goat hides. I place Ochollo in the northern region with Borada, although technically Ochollo is located to the south of Borada and is rather central, because it shares many cultural features with Borada (discussed in Chapter 4). However, among the central Gamo (Dita, Doko, Dorze, Kogo, and Zada) oral history revealed that until about thirty years ago everyone used both a *zucano* and a *tutuma* handle. In the past, *zucano* handles were used to scrape cattle hides and *tutuma* handles were used to scrape goat and sheep hides. The hide-workers claimed that they do not know why their ancestors used both handle types-- it was simply *woga* (culture).

Today, both handle types are used to scrape only cattle hides. Currently goat

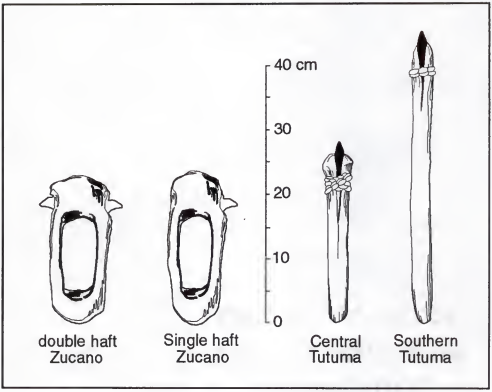


Figure 4-5: Illustration of Gamo *zucano* and *tutuma* handles.

and sheep hides are rarely scraped among most Gamo people. As discussed earlier, the import of western products and the increased export of goat hides means that there are fewer uses for scraped hides in Gamo society. This is especially true of sheep and goat hides that were used for clothing and agricultural sacks in the past. Based on the functional differences expressed by the elders, one would assume that *tutuma* handles, which previously were used to scrape goat and sheep hides, would no longer be in use today among the central Gamo. However, the current distribution of handle types suggests continued *tutuma* use among the central and southern hide-workers, and *zucano* use among the northern hide-workers (Figure 4-6).

Informants state that the resources used to make and use a *zucano* handle are located in a restricted area--the lowlands (*baso*), while the *tutuma* handle can be made out of any strong wood. The hide-workers informed me of the local names for the trees used to make the handles and mastic. Staff at the Chencha Agricultural Co-op and the University of Addis Ababa Herbarium identified these species and their elevation ranges.

As previously discussed in Chapter 3, the Gamo recognize two environmental zones: the highlands (*geza*) and the lowlands (*baso*). Scientific identification of the trees used to make a *zucano* type handle confirms they only grow in the *baso* environmental zone. The wood of the acacia and other lowland trees is very strong, and the tree's resin is used for the mastic to hold the scrapers in the *zucano* type handles. Today, the use of a *zucano* handle predominates in the *dere*s of Ochollo and Borada (Bekele-Tesema, Birene, and Tenganas 1993; Hedberg and Edwards 1995; Hedberg and Edwards 1989) (Table 4-1).

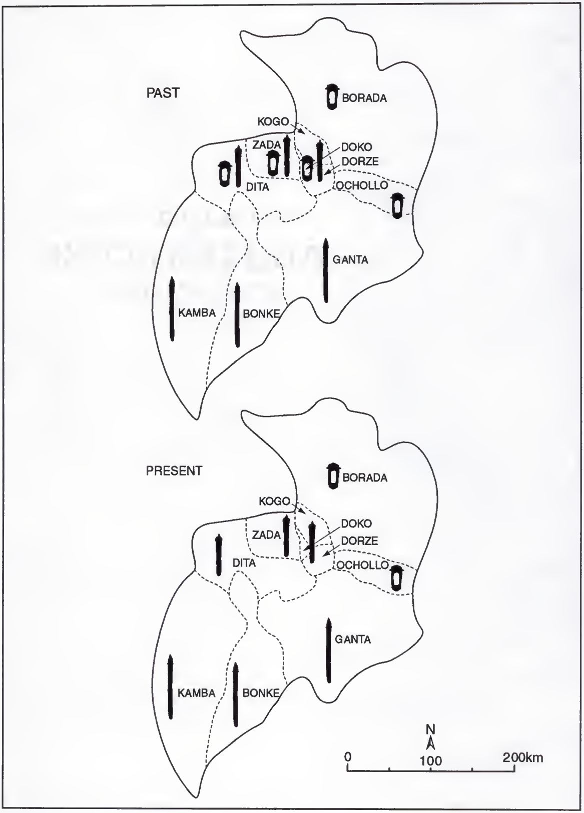


Figure 4-6: Map illustrating the past and present distribution of handle types among the Gamo.

Table 4-1: The different species of trees and their elevation and environmental zone used to produce *tutuma* and *zucano* handle types.

Handle	**Scientific Name**	**Elevation**	**Environmental Zone**
Tutuma	Galiniera saxifraga Maesa lanceolata Hagenia abyssinica Eucalyptus Sp.	Not Published Not Published 2450-3250 2300-3000	 *geza* /highland *geza*/highland
Zucano	Olea africana Cordia africana Schrebrea alota oleaceae Combregur combretaeceae Cupresse lustanica	Not published Not published 1500-2300 500-2300 Not published	 *baso*/lowland *baso*/lowland
Mastic	Acacia brevispica Acacia niolitica	900-2000 700-1700	*baso*/lowland *baso*/lowland

The central Gamo (Dita, Doko, Dorze, Kogo, and Zada), who previously used both handle types, live in the *geza* environmental zone, where the acacia does not grow. The *tutuma* handle can be made out of any strong wood, but is most typically made from eucalyptus and requires no mastic. The outer leafy cover of the enset plant is dried and used to make the twine, which holds the *tutuma* scraper in place. Today, the central Gamo hide-workers claim that the incentive or demand for hides and the price they receive is not good enough to make the effort to obtain resources from the lowlands to use the *zucano* type handle. Today, cattle hides are being scraped in the central Gamo region with a *tutuma* handle. However, the *tutuma* also predominates in Ganta, Kamba, and Bonke *dere*s, which have elevation ranges that span all the environmental zones. In this southern region, *tutumas* have always been used to scrape cattle hides as well as goat and sheep hides. Hence, it is more than environmental resource accessibility that is the driving force behind choice in handle style.

Furthermore, there is no connection between access to stone resources and the type of hafting. Previous researchers have proposed that direct access to resources leads to a curated tool form and indirect access leads to an informal tool form (Henry 1989; Parry and Kelley 1987; Shott 1986). The closed-hafted *zucano* handles tend to be associated with a more formalized tool form, while in contrast the open hafted *tutuma* handle is more associated with an informal tool form (see Chapter 5 for details). Yet, as illustrated in Figure 4-7, there is not a correlation between access to resources and handle type. The *zucano* users of the northern Gamo region have direct access to chert materials, as do some of the central and southern *tutuma* users. In addition, all four villages I studied, Mogesa and Amure which use a *zucano* handle and Eeyahoo and Patela who use a *tutuma* handle all have direct access to chert within a two to three hour walk. Clearly, other factors are dictating handle form outside the realm of access to raw materials.

It is not plausible to attribute the presence of two different handle types among the Gamo as the result of function for the following three reasons. First, today both handle types are used to scrape cattle hides. Secondly, in the past, the use of the two handle types for two different functions (i.e., scraping goat verse cattle hides) was only known in a small portion of the Gamo region. Third, the distribution of handle types does not correspond to their environmental regions for the needed resources. Economic factors led to the discontinued use of the *zucano* handle among the central Gamo. However, there is no basis for solely assigning resource availability as the limiting factor on the presence of the two handle types. In the past and today, handle types overlap environmental zones. The differences between handle types and

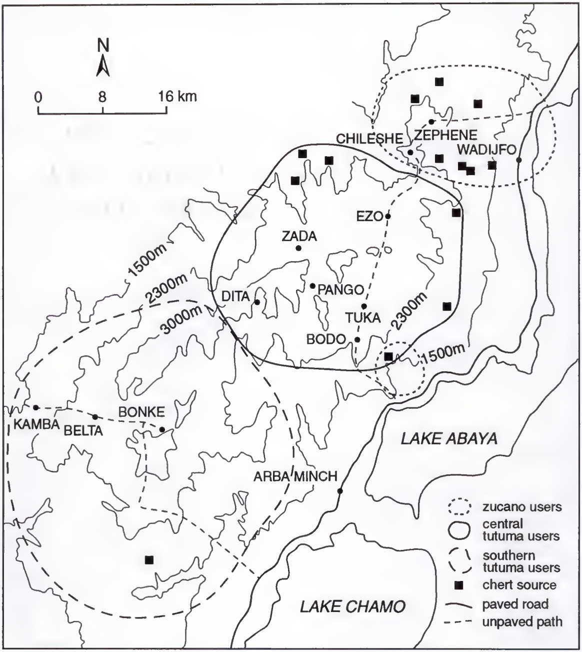


Figure 4-7: Map illustrating the *tutuma*- and *zucano*-using areas and their relationship to chert sources.

scrapers by handle type in terms of Gamo intrasocial groupings will be explored in the next chapter.

Hide Procurement

The hide-workers receive hides to scrape mostly at Mesqual (the Ethiopian New Year in late September) and during the Orthodox holidays of Christmas (January) and Easter (March). During these holidays, the Gamo sacrifice cattle in honor of the ancestors to preserve the fertility and health of land and people. The hide-worker is not allowed to slaughter the animal because of his association with pollution and infertility. Instead a sanctioned *baira mala* slaughters the animal, and then the hide-worker butchers the animal and removes its hide. After removing the hide from the carcass, the hide-worker takes the hide to his home

While the hide is still moist, the hide-worker uses the flat side of a metal knife in a rolling motion to remove the upper layer of fat on the inside of the hide. The hide-worker cuts seven to twelve holes along the edge of the hide. They stretch the hide out a few centimeters above the ground and wooden stakes are set through the cut holes to keep it in place. The hide dries in this manner for one to two days depending on the weather. The hide-worker rolls up the dried hide and stores it in the rafters of the house and in the branches of nearby trees. They usually scrape hides during the rainy season (March to May and July to early September), when the raw materials for scraper production are available. Since the current holidays do not correspond to the rainy seasons, the hides are kept and scraped later.

The Hide-Scraping Process

The hide-workers scrape the cattle hides to produce bedding, chairs, saddles, and drums. There is no variation in how cattle hides are scraped based on their final use. However, in 1995 we learned that if a hide is used for a saddle it is boiled in hot water in a ceramic bowl and that the hair is removed. I never witnessed this process nor worked with any hide-workers who still made saddles. Hair is not removed for the production of any of the other items, including clothing. Often the hide is only dried and not scraped to make chairs and drums.

The morning that the hide is to be scraped, it is taken to a stream or river and saturated in the water for one hour. During the hide scraping process, the hide-worker also periodically (four to five times per hour) sprays a mouthful of water onto the area of hide he is working to keep it moist. If the hide is too dry, it is very difficult to remove the fat from the innerside. After the hide is saturated in water, it is stretched out on a vertical wooden frame (*jima*). The upper edges of the frame's two poles either rest on the household wall if located inside the household or on a mud bank wall or against large enset plants. If the frame is located inside the household, it is always placed immediately to one side of the entrance, where there is sufficient light to see the hide. The hide-worker secures the hide on the frame by winding enset twine through the holes along the edge of the hide edge around the framing poles. They refer to the process of hanging the hide on the frame as *tolo*. The twine is tied at the top and the bottom to achieve an appropriate tension in the hide. The hide-worker taps on the hide to determine the appropriate tension of the hide for scraping.

The frame consists of three bamboo poles, two of which are planted in the ground at an angle of 75 to 85 degrees (relative to the ground) among the northern and central Gamo and 65 to 75 degrees for the southern Gamo. The angle of the frame at which the hides are hung also reflects handle type. For instance, in the *tutuma*-using villages of Eeyahoo and Patela, the frame has an angle of 70 and 85 degrees, respectively. In the *zucano*-using villages of Amure and Mogesa, the frame has an angle of 90 to 80 degrees, respectively. The angle at which the hide is hung is specific to lineage and village membership and hence reflects social differences.

Holding the handle with both hands and with one scraper against the hide, the hide-worker begins to remove the fatty innerlayer of hide by either a scraping or chopping motion. For scraping, the hide-worker shaves off long stripes of the fat from the innerside of the hide. For chopping, the hide-worker places his hand underneath a rough spot on the hide or along the hardened edges of the hides and pounds the hide in his hand with the scraper.

The hide is initially hung with the tail hanging along the bottom axis. This allows the hide-worker easier positioning to first scrape in the uppercenter of the hide, which is the most difficult and thickest area of the hide. After the hide-worker scrapes the exposed surface of the hide, he takes the hide down and rehangs it with the tail located at the top of the frame. Then he scrapes the area previously not reduced. The dogs eat the removed hide strips (*tukaa*) as they fall to the ground.

The mean number of scrapers or edges used (as some hide-workers use multiple edges of the same tool) for completely scraping a hide is 4.5 ($n = 29$, s.d. = 3.35, minimum = 1, and maximum = 17). The hide-worker resharpens the end of the

scraper with an iron billet when the edge becomes dull. The handle is held in one hand with the ventral surface of the scraper facing upward. The edge is hit with a small iron billet removing small flakes. The resharpening flakes fall directly onto the ground and later the hide-worker either 1) sweeps them to the edges of the household, 2) sweeps them outside the threshold, or 3) sweeps them onto a piece of hide and thrown in a pile with discarded scrapers. In one village, I studied the hide-workers collect scrapers and retouch waste and throw them into the garden next to their house. The other three villages studied had specific locations for discarding scrapers, usually located 10 to 50 meters from the household, within thorn bushes or in a small ravine. Individuals who live near one another often share discard locations. I also noted the presence of discarded scrapers near thresholds, hearths, and along pathways located near the hide-workers' households. I never found scrapers located on paths near the *mala* or *mana* households.

When the hide is near completion, the wife or mother of the hide-worker subtly walks past the hide feeling it with her hand, and if she is silent then she has given her approval for its completeness. The mean scraping time for a single hide is 4 hours and 24 minutes (n=29, s.d. = 2.43, minimum = 1.4, maximum = 11.05). This timing does not include breaks, but does include activities associated with hide-working including turning the hide around, adjusting the tension, and applying water. After he scrapes the hide completely, the hide-worker blows liquid butter on it and folds the hide over with his feet for over an hour every day for a week. Although butter is a luxury item, the hide-workers still use it to soften the hide. No tannin is added to the hide. However, in Zada the Gamo use cattle urine to wash their clothing. Oral history

indicates that in the past it is probable that all Gamo people washed their clothing in this manner. In North American cultures, urine was used to tan the hides (Nelson 1899:117). The Gamo may not tan their hides because they washed/or wash their clothing with urine, which acts as a preservative.

Scraper Morphology

There are several potential functional sources of variation for Gamo stone scrapers because of the different activities that occur during the hide-scraping process. Several sources of functional variation, however, have already been eliminated including: the scraping of hides of different species of animals, since today the Gamo only scrape cattle hides; the scraping of hides with two different handle types, for if there is variation here it is related to social differences rather than resource availability or function; and the angle and tension of the hide, which seems to reflect handle type and hence social differences rather than function. However, there are still five other potential sources of scraper variation that I discuss below, including the different stages of scraper use, differences in stone materials, scraping verses chopping activities, hafting verses nonhafting, and hide type (lowland versus highland).

Unused (*Oratay*) and Used-up (*Chima*)

The morphological differences of scrapers as observed in their different stages of use are based on 811 unused and 872 used-up scrapers collected from the four villages I studied in-depth (Mogesa, Eeyahoo, Amure, and Patela). The Gamo hide-workers do not discard scrapers before they are completely used-up. A good scraping

edge is a valuable resource to the hide-workers, one that they do not relinquish easily. It is doubtful to me that they ever discard a partially used scraper, unless the scraper breaks. The handles are stored separately (usually hung from an interior wall or in an enset tree) from unused materials (stored within bowls or bags kept near the scraping frame or under the bed) and discarded materials (near the hearth, outside the threshold, and in secondary lithic trash deposits).

Archaeologists have previously used planform and cross-section to determine the use and/or stage of use of scrapers (Dibble 1984, 1987; Kuhn 1992). I compared the planform, percentage of cortex, dorsal scar pattern, and cross-section between unused and used-up scrapers (see Appendix Figures D-1, D-2, D-3, and D-4). A graphic comparison of these attributes, in terms of percentages for unused and used-up scrapers, indicated that most of these variables are not affected by the use of the scraper. Since Gamo scraper technology is not a blade technology, the length of the scrapers is not twice as long as the breadth, and therefore even unused scrapers have a short planform. There is very little variation in the overall planform of unused and used-up scrapers. The hide-workers make the scrapers on tertiary flakes and therefore little cortex is ever present. However, used-up scrapers show slightly less cortex than unused scrapers, as would be expected with the removal of material through the resharpening process. A radial dorsal pattern dominates both unused and used-up scrapers. As the result of the reduction of the working edge and hence a reduction in the length of the scraper through use, used-up scrapers tend to have a plano-convex or triangular cross-section. In contrast, there is a fairly even distribution of lenticular, plano-convex, and parallelogram cross-sections for unused scrapers. I did not conduct

statistical tests between these variables because the graphic comparisons indicate little differentiation between the two forms.

A comparison of the unused and used-up scraper characteristics indicate a significant difference between all compared variables (i.e., medial breadth, maximum length, proximal thickness, distal thickness, breadth/length ratio, thickness/length ratio, weight, retouch scar length, and distal edge angle) except for medial breadth, proximal thickness, and weight (see Appendix Table C-1 for data). It is expected that the breadth and proximal thickness of the tool would be similar in unused and used-up specimens since the tool is not reduced in its breadth or proximal thickness during use, only its length. Furthermore, it is of interest that weight does not significantly change despite the reduction in length of the used edge.

Used-up scrapers are statistically significantly different in their overall morphology from unused scrapers, as indicated in the comparison of distal thickness/length and breadth/length ratios. Each time a scraper is resharpened it is hit with the iron billet an average of 20.1 times (n = 132, s.d. = 16.6, minimum = 3, maximum = 172) removing between 0.27 to 12.76 grams of resharpening flakes, which are all less than 1 mm in size. The amount of reduction in the scrapers from their unused to used-up stage was configured in two ways. First, based on direct observation of 127 scrapers and recurrent measurement of the scrapers throughout their use, I determine that the average scraper is reduced 0.64 cm (n=127, s.d. = 0.56, minimum = 0, maximum = 2.6) during their complete use. Secondly, by subtracting the mean length of used-up scrapers (2.76 cm, n=872) from unused scrapers (3.42 cm, n= 811), I configured a very similar value at 0.66 cm.

The most important attribute of the scraper for the hide-workers is the working edge. There is a statistically significant difference between the distal thickness of the unused scrapers and the used-up scrapers. When they sorted the scrapers, they did so by placing the ventral side face up and examining the distal ventral working edge. They all said that the scrapers with the thin distal tip (their criteria not mine) were unused or still useable. They were fairly accurate in their assessment of which scrapers were unused and which were used-up. However, the villages which used the *zucano* type handle were more accurate (86 percent correct for unused and 92 percent correct for used-up) than the *tutuma* villages (56 percent correct for unused and 50 percent correct for used-up). This may be a result of the nature of the two scraper types and the fact that the *tutuma*-users make use of more than one edge of the tool. In fact, in the *tutuma*-using village of Patela, I was told that all of the scrapers in the assortment were still useable.

Archaeologists commonly use edge angle to distinguish unused from used-up archaeological scrapers. This study also finds a statistically significant difference between the mean unused and used-up edge angles. The mean edge angle of an unused scraper is 50.45 (n=811, s.d. = 10.57, minimum 18, maximum 94) and the mean edge angle of used-up scrapers is 67.21 (n=872, s.d. 12.64, minimum 26, maximum 114). Unfortunately, it was impossible to measure the edge angle of the scrapers when they were hafted and being used, as the head of the handle would prevent the arm of the goniometer, even when the arm was shortened as far as possible, from resting on the scraper edge. The only way to measure it accurately would be to take it out of the haft and this was not practical for a living situation.

A wear analysis of the scraper edge indicated increased rounding of the edge through use. I define rounding as a decrease in the number of intact channels and ridges. I examined 203 unused and 136 used-up scrapers. The mean number of intact ridges on unused scrapers was 10.10 (s.d. = 4.15, variance = 17.28, minimum = 1, and maximum = 24). In contrast, the mean number of intact ridges on used-up scrapers was 2.97 (s.d. = 2.34, variance = 5.49, minimum = 0, and maximum = 11). Although there is a statistically significant difference between the number of intact ridges on the used edge of unused and used-up scrapers (t-test results indicate 4.65, with t-critical at 1.96 in the 0.05 confidence level), postdepositional factors may significantly interfere with any microwear results. The hide-workers made minimal efforts to keep discarded lithic materials out of the paths of feet. However, I often saw scrapers on paths near *degala* households, where people, cattle, horses, sheep, and goats could easily trample them. Furthermore, scrapers were not gently dropped or placed in the discard piles but usually thrown. The falling of scrapers and other stone materials onto each other and trampling by humans and domesticated stock could easily cause edge damage obscuring rounding and even break the scrapers.

Obsidian (*Salloa*) and Chert (*Goshay*)

The Gamo use two types of raw material, chert and obsidian, to scrape hides. Today, the Gamo hide-workers rarely use obsidian because it is expensive to obtain through trade with the Wolayta peoples and because it is rare to find a good useable piece on a local archaeological site. Obsidian is used predominately by hide-workers living in Borada, Ochollo, Kogo, Zada, Dita, and Doko, but is not known among the

southern most Gamo (Ganta, Bonke, and Kamba). Hence, both *zucano* - and *tutuma*-using hide-workers employ the use of chert and obsidian. Eight (five *tutuma*-users and three *zucano*-users) of the twenty-nine hide-workers I observed used an obsidian scraper, and none of the hide-workers used obsidian to the exclusion of chert to scrape the hide. In all, I collected eleven used-up obsidian scrapers, which I witnessed being used. Below, I compare the number of times chert and obsidian working edge are used before they are resharpened. Compared to chert scrapers, obsidian scrapers held their edge slightly longer when being used for scraping, but not for chopping (Table 4-2).

Table 4-2: The number of scrapes for chert and obsidian edges before resharpening.

Raw Material	**Mean Number Scrapes**	**Mean Number of Chops**
Chert (n=142)	201.5	82.0
Obsidian (n=11)	247.0	70.9

In addition, I compared the presence of intact ridges on the used-up obsidian scrapers to the used-up chert scrapers. The mean number of ridges on the used-up obsidian scrapers was 5.25 (n=11) and 2.85 (n=142) on the chert scrapers. The latter also seems to confirm that obsidian holds its edge better than chert. Furthermore, the mean reduction length of obsidian was 0.9 cm (n=11) in comparison to 0.6 cm for chert (n=142) from their unused to used-up stages.

A comparison of the morphology of Gamo obsidian and chert scrapers indicates that there are few significant morphological differences between the two material types. The following data are based on my total collection of scrapers from

four villages studied in-depth and not simply on those I observed being used. Unused obsidian scrapers were slightly longer and with a larger breadth/length ratio, than unused chert scrapers (see Appendix Table C-2 for data). Unused obsidian scrapers were also statistically significantly thinner on the proximal end than chert scrapers. However, after the scrapers have been completely used-up there are no statistically significant differences between them (see Appendix Table C-3 for data). The larger reduction of obsidian scrapers compared to chert scrapers during use allows them to be morphologically similar in length in their used-up stage.

Hence, although the Gamo more frequently resharpen chert scrapers, obsidian scrapers are reduced more in length, and except for unused length there are few morphological differences between the scrapers made of the two raw material types. The Gamo make a specific scraper type regardless of the raw material from which it is made.

Scraping (*Katcha*) and Chopping (*Coata*)

The Gamo hide-workers do not intentionally make two different scrapers to scrape and chop at the hides. However long, thin, and sharp scrapers, i.e., unused and partially used scrapers are used to scrape. Once the edge of the tool becomes thicker and duller, it is used for chopping. When a scraper begins to dull, the hide-worker starts to use it for chopping. In this study of thirty scrapers, which began unused and were used for both scraping and chopping, the hide-workers used the edge for scraping an average of 1542.39 scrapes (s.d. = 1078.83, minimum = 382, and maximum = 5072) before using it for chopping. I never witnessed a completely unused scraper

edge being used for chopping. The hide-workers stated that they used a duller edge because a very sharp edge could easily hurt the palm of their hand, which they place directly under the hide while chopping.

The average number of times a scraper is used for scraping and chopping before it is resharpened is 204.8 and 161, respectively (n=153 scrapers). This suggests that when the edge is used for chopping it needs to be resharpened more frequently. I questioned the hide-workers as to why they frequently sharpened the edge of a scraper, when they used it for chopping. They replied that the edge becomes rough and hurts their hand, so they work the edge to smooth it out. I witnessed and collected some used-up scrapers (numbering 30) that were used only for scraping, and other used-up scrapers that were used for both scraping and chopping (numbering 64).

A comparison of the measurable attributes of the scrapers differentiated by their use in different activities indicates changes in distal thickness, distal/length ratio and retouch length (see Appendix Table C-4 for data). Scrapers used only for scraping had a significantly thinner distal working edge, and had less depth to their retouch scars than scrapers used for scraping and chopping. This corresponds to the informants' comments that they use scrapers for chopping when they look duller and have a thicker distal edge. Longer retouch scars may be the result of chopping edges needing more working of the edge, as indicated above. However, scrapers used for chopping may also have longer retouch scars because they tend to be used longer before chopping commences, than tools used only for scraping. Thus, there are significant differences in the distal thickness and retouch scar length for scraper morphology based on the use of a scraper for either scraping or a combination of

scraping and chopping. In addition, although there is a significant difference in the breadth/length ratio between scrapers used for the two functions, it is barely significant.

Hafting

Archaeologists have suggested that hafted tools bear distinct characteristics, which distinguish them from unhafted tools (Keeley 1982, Odell 1994). The Gamo only use hafted tools in their hide-scraping work, and so it is only possible to examine the characteristics from this viewpoint. However, the Gamo do have two types of handles, one closed-socket with mastic and one open-socket without mastic. The scrapers hafted in mastic often had mastic residues covering the socketed portion of the scraper. There were also perpendicular striations embedded in the mastic on the ventral side. Many signs of hafting are determined through microwear studies, but I only had access to a 20x hand lens and so did not witness any marks such as striations (not embedded in mastic) or polish.

Gamo scrapers exhibit signs of hafting such as lateral notching, ventral thinning, secondary spurs, and dorsal ridge reduction (Table 4-3). These characteristics were present only in a small proportion of the assemblage. Lateral notches are created to fit the tool better into the haft or caused by friction of the tool against the haft. Lateral notching was present on 0.05 percent of the used-up scrapers. The hide-workers also use ventral thinning (*zucano* and *tutuma* handles) and dorsal ridge reduction (*zucano* only) to reduce the thickness of a scraper to better fit it in the haft. Ventral thinning was present on 12.99 percent of the scrapers and dorsal ridge

reduction was less frequent on only 1.8 percent of the scrapers. The presence of secondary spurs on the proximal end of scrapers as the result of reharpening after transverse hafting snaps is reported in archaeological specimens (Rule and Evans 1985). Secondary spurs were not present on the Gamo scrapers, as the hide-workers refused to use scrapers that had broken. When the distal tip became unusable on *tutuma* scrapers and a lateral side was used, there was still no evidence of secondary spurs. Although lateral notching, ventral thinning and dorsal ridge reduction do occur as the result of hafting, it is not present on all hafted tools. Therefore, the absence of these characteristics can not be taken to indicate the lack of hafting.

Table 4-3: Hafting characteristics for scrapers.

Characteristics	**Number Frequency n=2055**	**Percentage**
Lateral Notching	6	0.05%
Ventral Thinning	267	12.99%
Secondary Spurs	0	0%
Dorsal Ridge Reduction	37	1.8%

Lowland (*Baso*) and Highland (*Geza*) Hides

All the Gamo hide-workers scrape both highland and lowland cattle hides. I observed twelve lowland hide-scrapings and seventeen highland hide-scraping events. The lowland hides tend to be thicker, ranging from 3 to 6 mm with a mean of 3.95 mm, while the highland hides range from 2 to 3 mm with a mean of 2.76 mm in thickness. A t-test indicates that there is a significant difference in the thickness between these two types of hides (see Appendix Table C-5). From head to tail, the

hides average 170.62 cm in length and 134.93 cm in width. Lowland hides tend to be slightly smaller, averaging 168.4 cm (range 160 to 190) in length and 131.8 cm (range 116 to 145 cm) in width. Highland hides average 174.17 cm (range147 to 208 cm) in length and 140.5 cm (range 110 to 220 cm) in width. However, because of the high variability in sizes, probably based on individuality, age, and the sex of the cattle, there is not a statistically significant difference in the size between lowland and highland cattle in my sample (see Appendix Table C-5).

All the hide-workers claimed that it takes longer to scrape a lowland hide because they are thicker and rougher. My observations indicated that the time to scrape highland hides averaged 4 hours and 6 minutes (range 1.70 to 7.41 hours) and lowland hides 4 hours and 34 minutes (range 1.40 to 11.05 hours). There is considerable overlap in the time ranges, which renders the difference in scraping time between the two types of hides insignificant (Table 4-4 and Table 4-5).

However, what does seem to be affecting the time to scrape a hide is the type of hide in conjunction to how much they reduce it through scraping. The only real exception is Arka (Table 4-4), who took 5 hours to reduce his highland hide only 1-mm. However, Arka claimed to have poor chert to work with and frequently had to change his scraper, which took up extra time.

As stated earlier, a single hide-scraping event takes 4-1/2 hours with a mean of 4.5 scrapers per scraped hide. Hence, there is an average use of one scraper edge per hour. In a comparison of 29 hide-workers, I observed an average use of 5.0 scraper edges for lowland hides and 4.1 scraper edges for highland hides. Since we have already determined that the amount of material reduced is important in discerning the

time spent on the hide, it might also relate to the number of scrapes and scraper edges used per hide. The number of chops is probably not as significant in relationship to other variables because chopping is primarily conducted on the edges of the hide that shrivel during drying. Sometimes, the hide-workers cut off parts or the whole edge rather than chopping at it. The mean number of scrapes per hide is 1541 and the mean number of chops is 793 per hide.

Tables 4-6 and 4-7 indicate that the number of scrapes is related to the type of hide and the amount that the hide is reduced, but it is also related to the size of the hide. The more scrapes or chops incurred, the more the hide is reduced and/or the larger the hide. A comparison of the highland hides (Table 4-7) indicates that Mola, Yonja, Buta, and Amaylo have a slightly lower number of scrapes for the removal of 1.5-2 mm off a highland hide than Yeka, who also removed 2 mm off a highland hide. However, Yeka had a very large hide, and Mola, Yonja, Buta, and Amaylo even have smaller hides than most of those who only removed 1 mm on highland hides. Hence as would be expected, the number of scrapes increases with the amount of material removed and the size of the hide.

In addition, the more material that the hide-workers removed generally the higher the number of scrapers used (Table 4-8 and Table 4-9). The exceptions for lowland hides are Darsa and Garbo. Darsa and Garbo removed 2 mm but scraped the smallest hides and so did not use as many scrapers as others who also scraped off 2 mm. Awesto, Arba, and Amaylo have found their own chert source, which was not previously exploited through the generations and is of poorer quality than that used by other villages. This may explain why they used such a large number of scraping edges

Table 4-4: Lowland hides- time and thickness.

Person	**Time (hour)**	**Thickness Reduced mm**
Tesfy	11.05	2
Awesto	8.43	2
Goa	8.08	2
Darsa	3.35	2
Mokano	3.17	2
Garbo	2.30	2
Bedala	2.23	1
Galche	2.20	1
Hanicha	2.15	1
Chamo	2.08	1
Osha	1.50	1
Hagay	1.40	0.5

Table 4-5: Highland hides -time and thickness.

Person	**Time (hour)**	**Thickness Reduced mm**
Buta	7.42	2.0
Yonja	6.58	2.0
Yeka	6.25	2.0
Arka	**5.00**	**1.0**
Mola	4.33	1.5
Amaylo	4.17	1.5
Tina	4.00	1.0
Tsoma	3.45	1.0
Arba	3.42	1.0
Unkay	3.20	1.0
Basa	2.41	1.0
Abata	2.40	1.0
Uma	2.40	1.0
Tinko	2.30	1.0
Mardos	2.00	1.0
Gaga	2.00	1.0
Gamana	1.40	1.0

Table 4-6: Lowland hides and scraper use.

Person	**Number Scrapes**	**Number Chops**	**Thickness Difference mm**	**Mean Breadth/Length cm Ratio of Hide**
Awesto	12793	3021	2	0.77
Goa	11369	7023	2	0.77
Tesfy	10740	20086	2	0.86
Darsa	9101	1640	2	0.67
Garbo	7263	2940	2	0.72
Galche	7807	2064	1	0.80
Hanicha	6807	1922	1	0.83
Osha	5810	1125	1	0.88
Mokano	5260	4254	1	0.79
Chamo	4731	1714	1	0.76
Bedala	4706	1283	1	0.76
Hagay	2946	855	0.5	0.81

Table 4-7: Highland hides and scraper use.

Person	**Number Scrapes**	**Number Chops**	**Thickness Difference mm**	**Mean Breadth/Length cm Ratio of Hide**
Yeka	14122	9137	2	1.37
Arka	12589	3628	1	0.82
Tina	11310	2810	1	1.00
Tinko	10940	589	1	0.73
Basa	10201	3913	1	0.93
Unkay	8583	3470	1	0.67
Mola	**9732**	**5443**	**1.5**	**0.75**
Yonja	**8112**	**13641**	**2**	**0.71**
Buta	**7811**	**9277**	**2**	**0.75**
Amaylo	**7734**	**1121**	**1.5**	**0.78**
Gaga	7356	1607	1	0.74
Abata	7154	4979	1	0.68
Tsoma	7122	4334	1	0.80
Mardos	6967	2037	1	0.71
Arba	6537	3087	1	0.86
Gamana	5226	2567	1	0.69
Uma	4961	1698	1	0.76

Table 4-8: Lowland hides and number of scraper edges.

Person	**Number of Edges used**	**Thickness Difference mm**	**Mean Breadth/Length cm Ratio of Hide**
Awesto	**17**	**2**	**0.77**
Tesfy	8.0	2	0.86
Goa	5.5	2	0.77
Mokano	4.5	1	0.79
Osha	4.0	1	0.88
Hanicha	3.5	1	0.83
Galche	3.5	1	0.80
Chamo	3.5	1	0.76
Bedala	3.5	1	0.76
Hagay	3.5	0.5	0.81
Darsa	3.0	2	0.67
Garbo	1.0	2	0.72

Table 4-9: Highland hides and number of scraper edges.

Person	**Number of Edges used**	**Thickness Difference mm**	**Mean Breadth/Length cm Ratio of Hide**
Arka	12.0	1.0	0.82
Amaylo	9.0	1.5	0.78
Arba	6.0	1.0	0.86
Yeka	5.5	2.0	1.37
Buta	4.5	2.0	0.75
Yonja	4.0	2.0	0.71
Mola	4.0	1.5	0.75
Mardos	3.5	1.0	0.71
Gamana	3.5	1.0	0.69
Tsoma	3.0	1.0	0.80
Uma	3.0	1.0	0.76
Tinko	3.0	1.0	0.73
Unkay	3.0	1.0	0.67
Tina	2.5	1.0	1.00
Basa	2.0	1.0	0.93
Gaga	1.0	1.0	0.74
Abata	1.0	1.0	0.68

on their hides compared to the others, who scraped highland and lowland hides. As mentioned before, Arka also informed me that his chert was of low quality and that was why he used so many scrapers.

As stated above, the Gamo hide-workers informed me that they take longer and use more scrapers to scrape lowland cattle hides. The latter were both confirmed by my observations. Furthermore, they commented that the age and sex of the cattle had no effect on their hide processing methods. They also clearly stated that they did not make different types of scrapers to scrape highland and lowland cattle. Since the hide-workers do not intentionally make two different scrapers types to scrape these different types of hides, it is not possible to compare unused scrapers differentiated by hide type.

However, I do have a sample of 54 highland used-up scrapers and 57 lowland used-up scrapers for which I have good context. The t-tests indicate that there is only a significant difference between scrapers used on highland hides versus lowland hides in terms of medial breadth, distal thickness and retouch scar length (see Appendix Table C-6). Lowland hides require a sturdy edge to remove the rough material. The scrapers used on lowland hides have a higher retouch scar length and a higher distal thickness, but a smaller medial breadth, which would make the tool sturdy. The latter in connection with the fact that more scrapers are used to scrape lowland hides than highland hides suggests that scrapers used on lowland hides wear faster than those used on highland hides.

Discussion

A regional study of the Gamo environment and hide-working practices illustrates that some culture specific activities affect stone tool morphology. This study looked at several aspects of scraper function not previously recorded among the hide-workers of southern Ethiopia, notably the use of chert and obsidian, chopping verses scraping activities, and the scraping of both highland and lowland cattle hides. The Gamo chose to procure locally made cherts and virtually ignore quartzite sources. They also establish long-distance resources to acquire obsidian for scraper production. Differences in raw material and procurement strategies have been cited as a source for variability in the archaeological record, even within a single culture (Luedtke 1976; McAnnay 1988; Odell 1989; Rule 1983; Tankersley 1990). However, I found that procurement strategies are not related to scraper form or to hafting type among the Gamo. Furthermore, there is not a significant difference between the used-up scraper morphologies of Gamo chert and obsidian scrapers.

The distal thickness and length of the retouch scars were affected by both differences in the activities such as scraping versus chopping and differences in the type of hide being scraped. Scrapers used for chopping and scraping had a thicker distal thickness and more retouch scarring than those used only for scraping. This concurs with emic information that stated a thicker edge was needed for chopping a hide, and the observance that scrapers used for chopping and scrapping were more frequently sharpened than those used just for scraping. Among the Sidama, Wolayta, and Gurage, we discovered that the hide-workers intentionally made longer scrapers for scraping and shorter-thicker scrapers for chopping (Brandt and Weedman 2000).

The Gamo, however, do not intentionally make two different scraper types for chopping and scraping.

In general, the Gamo use fewer scrapers to scrape a highland hide than a lowland hide. Generally, lowland hides are thicker, reduced an average of 2 mm, while highland hides are thinner, and reduced only 1 mm. In support of the fact that more scrapers are needed to scrape lowland hides, I discovered that the distal thickness and retouch scar length of scrapers used on lowland hides was higher on both accounts.

My functional study of Gamo scrapers did not produce results similar to studies of other ethnic groups including the Sidama, Konso, Gurage, Oromo, and Wolayta (Brandt and Weedman 2000; Clark and Kurashina 1981; Gallagher 1977a, 1977b:214-299; Haaland 1987:66-70)(Table 4-10). Only the Konso use chert like the Gamo, and all the other ethnic groups use obsidian exclusively. The Gamo did not use obsidian to the exclusion of chert while I observed them scraping a hide. Therefore, I cannot compare the number of chert verses obsidian edges used to scrape one hide among the Gamo. I recorded an average of 4-hours and 25 minutes for a hide-scraping event using 4.5 scraper edges reduced an average of 0.60 cm each. In contrast, Gallagher (1977b:267-268, 278) found among the Gurage that during a 6-hour scraping process 2 to 4 scrapers were used and reduced 2.45 cm each. Brandt and Weedman's (2000) study of the Gurage found similar results with an average reduction of 2.59 cm per scraper. Clark and Kurashina (1981) stated that during an 8-10 hour hide scraping event of the Oromo two scrapers were exhausted and reduced 2.54 cm each in length. Haaland (1987:70) also reported a six-hour scraping period

but with the use of four scrapers for cattle and two for smaller hides. However she does not indicate how much the scrapers were reduced by nor give any measurements of her unused and used-up scraper lengths. Brandt and Weedman's (2000) study of the Wolayta indicated an average reduction of scrapers by 1.2 cm.

Table 4-10: Comparison of cross-cultural studies of hide-working variables for one hide-scraping event.

Ethnic Group Researcher	**Time (hours)**	**Number of Used Scrapers/Edges**	**Reduction Length of Each Scraper**	**Resharpening Frequency per number of scrapes**
Gamo Present study	4.25	4.5	0.60 cm	247
Sidama Brandt and Weedman		1	3.72 cm	46
Konso Brandt and Weedman		2 to 6	1.63 cm	59.6
Gurage Brandt and Weedman		2 to 7	2.59 cm	95
Gurage & Oromo Gallagher (1977)	6	2 to 4	2.45 cm	100
Oromo Clark & Kurashina (1981)	8 to 10	2	2.54 cm	15 to 20
Wolayta Brandt and Weedman		2 to 10	1.2 cm	112
Wolayta Haaland (1987)	6	4	Not reported	50 to 60

Furthermore, the Gamo use their obsidian scrapers an average of 247 scrapes before resharpening. In comparison, the Gurage resharpen after an average of every 90 to 100 strokes (Brandt and Weedman 2000; Gallagher 1977a), the Wolayta after every 50 to 112 scrapes (Brandt and Weedman 2000; Haaland 1987:69), the Konso after every 60 scrapes (Brandt and Weedman 2000), the Sidama after every 46 scrapes (Brandt and Weedman 2000), and the Oromo after only 15-20 scrapes (Clark and Kurashina 1981).

In experimental studies, archaeologists determined that resharpening is necessary after even a higher number of strokes than most ethnographic research. For instance, with quartz scrapers was resharpened after 500-600 strokes (Broadbent and Knutsson 1975) and flint every 500-600 strokes (Brink 1978:97). The Gamo tend to resharpen scrapers less often and reduce them less in length than other southern Ethiopian ethnic groups. It is apparent that each ethnic group is different in terms of time spent, amount of resharpening, and the amount of scraper reduction.

I also noted a significant difference found between unused and used-up scrapers in terms of length, distal thickness, retouch scar length, and edge angle. However, I found that breadth, proximal thickness, and weight remained similar. Dibble (1984, 1987) and Kuhn (1992) are strong advocates for reduction stages as the source for variation in scraper morphology found in the Middle Paleolithic. Dibble's (1987) experimental work demonstrated reduction in length and increase in evidence of retouch. Although Gallagher (1977b:278-279) noted differences in length, breadth, and thickness (I am assuming proximal thickness since this is a more common measurement), his numbers of unused (n=18) and used-up (n=12) are too small for

statistical comparison. He did not examine retouch scar length, distal thickness, weight, or edge angle. Brandt and Weedman (2000) noted that the greatest difference between unused and used-up scrapers was in their length, which ranged from 1.2 to 3.72 cm shorter after use, depending on the ethnic group. Clark and Kurashina (1981) found a statistical difference in the length and thickness between unused and used-up scrapers, but also found that breadth was significantly affected.

The mean edge angle of Gamo unused scrapers is 50-degrees and when used-up a mean of 67-degrees. My results differ from Clark and Kurashina's (1981), who found a 44-degree mean distal edge angle for unused scrapers and a 56.6-degree mean distal edge angle for used-up scrapers. My unused edge angles and Clark and Kurashina's (1981) unused and used-up edge angles are within Wilmsen's (1968) experimental study of edge angles for hide-working with flint scrapers (46-55 degrees). However, the Gamo use their scrapers to a higher edge-angle than the Oromo. More in line with my own study of the edge angle of used-up scrapers is Broadbent and Knutsson (1975) experimental study of quartz scrapers, finding that 55 to 65 was the best edge angle for scraping hides.

I recorded the presence of increased rounding of the distal edge through use of the scraper's edge. In contrast to my own findings of rounding of used-up scraper edges, Clark and Kurashina (1981) noted irregularities along the used edge. Vaughan (1985:26-27) and Hurcombe (1992:24-26) stated that the harder the material the more quickly rounding occurred. The difference between my results and Clark and Kurashina's (1981) results was that they were looking primarily at obsidian and I at chert. Even my comparison between chert and obsidian scrapers indicated that chert

scrapers tend to dull more quickly. Brink (1978:102) who experimented with flint scrapers also noted rounding as the most important kind of use-wear associated with hide scraping.

The discovery of traces of bitumen on Middle Paleolithic stone tools is the earliest evidence for the hafting of scrapers (Boeda et al. 1996). I noted on the Gamo tools, as did Hardy (1996) in his study of Brandt's 1995 collection (Sidama, Gurage, Gamo, Konso, and Wolayta ethnic groups), the presence of mastic remaining on the scrapers after they were discarded. Hardy (1996) and I also noted the presence of striations running perpendicular to the haft along the distal ventral side within the mastic present on scrapers. Archaeological material and experimental studies have suggested several other stone characteristics that may indicate hafting including lateral notching and/or crushing, ventral thinning (Clark 1958a; Deacon and Deacon 1980; Gallagher 1977b:410; Hayden 1979:26-27; Keeley 1982; McNiven 1994; Nissen and Dittemore 1974; Rule and Evans 1985; Shott 1995), polish and crushing of dorsal ridges, as well as organized striature (Beyries 1988; Shott 1995). Clark and Kurashina (1981) also observed the presence of patina, polishing, and striations on their used-up and buried scrapers. In experimental studies of hide- working, Brink (1978:102-103), Hayden (1993), Keeley (1980:50), Kimball (1995), and McDevitt (1987) recorded the presence of a luster or polish especially on drier hides. Although I noted the presence of ventral thinning, purposeful dorsal ridge reduction, and notching, the occurrence of these features was low, indicating that tools may be hafted without these characteristics. Furthermore, I was not working with polarized light and a microscope, so I did not note the presence of polishing or non-mastic striations. Hardy (1996)

though observed the presence of striations (not embedded in mastic) on the ventral and dorsal sides of *tutuma*-hafted scrapers. Experimental studies by Vaughan (1985:35-36, 37-44) and Hurcombe (1992:71-78) warn that polishing and striations can occur as the result of environment, such as with the presence of rough soils, grit, and alkaline soils.

There are many differences expressed by Ethiopian hide-workers concerning the hide-working process that indicate cultural rather than functional differences in stone tool morphology. Although there seem to be some general functional consistencies such as a reduction of scraper length, an increase in edge angle, and an increase in distal thickness, the mean measurements for these attributes are different between each ethnic group. Furthermore, the differences in the hours spent scraping, the number of scrapers used, and the amount that a scraper is reduced during scraping seems to reflect differences in ethnicity and cultural choice. In addition, the use of obsidian and chert, the activities of both scraping and chopping at hides, and the scraping of highland and lowland hides seem to be unique so far as known to the Gamo people. Although we may be able to discern differences in the tools based on these different activities, we must remember that they are Gamo-specific activities and thus culturally selected.

CHAPTER 5
ETHNIC, REGIONAL, AND POLITICAL-RITUAL DISTRICTS (*DERES*) AMONG THE GAMO

Archaeologists use stone tools to define cultural complexes, traditions, and ethnic groups in European (Bordes 1961; Bordes and de Sonneville-Bordes 1970), African (Clark 1954; Goodwin and Van Reit Lowe 1929; Leakey 1953; Phillipson 1977), and American archaeology (Krieger 1944; Willey and Phillips 1958). A few studies even employ lithics to discern intracultural regional and political units (Holmes 1988; Micheals 1989). However, these studies form no consensus concerning which attributes are important for discerning social representation. They also tend to focus on lithic reduction sequences, local access to raw material, and trade rather than directly associating stone tools with intracultural identities. Yet, lithics are made by individuals, whose knowledge of the material world is learned and communicated within specific cultural contexts. Stone tools, such as those made and used by the Gamo hide-workers, are spatially distributed on the landscape and bear shape-defining attributes, which symbolizes their maker's identities. These include membership within a language family (interethnic), and more localized subregional (north, central, and south) and socio-political districts (*deres*).

Interethnic Relationships

The shared ideology concerning the role of artisans in Omotic societies, including the Gamo, provide a partial explanation for the distribution of hide-working materials within Gamo society. The Gamo are unique in Ethiopia for their use of two different handle types. Functional factors such as differences in use and access to

resources do not adequately explain the presence of two different handle types among the Gamo (see Chapter 4). For instance, it does not explain: 1) why some Gamo people never used a *zucano* even in the past, while others did and still do; 2) the continued use of a *zucano* handle in some highland villages; nor 3) the continued use of a *tutuma* in some lowland regions.

The Gamo have many Omotic-speaking neighbors, but to date, there is only information about the hide-working material culture of the artisan groups for the Wolayta (Teshome 1984) and Oyda people (Feyissa 1997). The Wolayta and Oyda, like the Gamo, consider artisans to be a submerged group. The Gamo people share cultural similarities concerning the role of artisans as healers, circumcisers, and messengers with their bordering Omotic-speaking neighbors the Wolayta and Oyda (Table 5-1).

Table 5-1: A comparison of artisan categories and roles among the Wolayta, Gamo, and Oyda. *Degala*, *chinasha,* and *mana* are the different terms used to define caste groups in Omotic societies.

	Wolayta	**Northern Gamo**	**Southern Gamo**	**Oyda**
Hide-workers	*degala*	*degala*	*mana*	*mana*
Potters	*chinasha*	*chinasha*	*mana*	*mana*
Healing/ Ritual Cleansing	*chinasha*	*chinasha*	*mana*	*mana*
Circumcision	*chinasha*	*chinasha*	*mana*	*mana*
Musician	*chinasha*	*chinasha*	*mana*	*mana*
Artisans intermarry	no	no	yes	yes

The northern Gamo and the Wolayta refer to hide-workers and smiths as *degala* and potters as *chinasha*. They also share some other cultural characteristics, such as: 1) the potters rather than the hide-workers serve as musicians, healers, and circumcizers; 2) the artisans do not have their own village leaders; 3) the hide-workers and potters represent different social groups and are forbidden from intermarrying; and 4) they share some clan names like Zutuma and Boradamala. In addition, the Gamo and the Wolayta

share a history. Northern Gamo and Wolayta oral history states that in the past there were seven brothers, Wolayta, Gamo, Kullo, Gofa, Konta, Kucha, and Borada, who moved west of the Omo River to Kinde to settle near Waho Gongolua (a cave). There was a dispute and all six brothers left to resettle other areas except for the Wolayta (Teshome 1984). The Borada Gamo people share their border with the Wolayta ethnic group. The Borada speak the Wolayta language as well as their local Gamocalay. The northern Gamo hide-workers are the only ones I interviewed who married women from another ethnic group (i.e., the Wolayta).

The southern Gamo and the Oyda also share some cultural similarities associated with the artisans. They both use the word *mana/menna* to include both potters and hide-workers and as such there is intermarriage between the potters and the hide-workers. In addition, the hide-workers rather than the potters perform ritual healing and serve as musicians. These cultural traits are not seen among the northern Gamo and Wolayta artisans. Furthermore, according to the oral history of the Oyda, some of their ritual-sacrificers, *Kati*, claim descent from the Gamo (Feyissa 1997:21). The tradition states that in the remote past a woman fled from Gamo, after she was impregnated by the sun, and gave birth to twins. The Oyda people were awed by her birth of twins and by her cooking skills. The Oyda honored the twins by giving them the position of *Kati*.

The neighboring Omotic-speaking ethnic groups have similar handle styles as the Gamo people (Figure 5-1). The northern Gamo artisans and the Wolayta both use a *zucano* handle for scraping hides, and both refer to it as a *zucano*. The Oyda, like the southern Gamo, use only the *tutuma* style handles (Feyissa 1997). The 1995 survey of southern Ethiopia hide-workers in which I participated demonstrated that ethnic and geographical differences are expressed in the handle, socket, and scraper morphology of the Gurage, Sidama, Hadiya, Wolayta, Gamo, and Konso peoples (Brandt 1996; Brandt et al. 1996; Brandt and Weedman 2000). The Gamo *zucano* (two-hafted mastic)

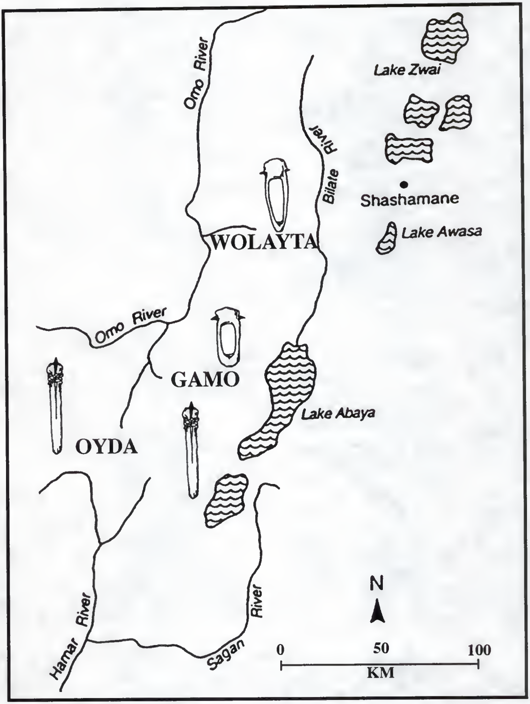


Figure 5-1: Map locating the Gamo, Oyda, and Wolayta people and the handle types used by each.

handles are most similar to the Wolayta two-hafted mastic handles. Geographically, the Wolayta peoples live in closest proximity to the Gamo peoples and both ethnic groups are Omotic speakers and share similarities in their social and political structures. The socket sizes of the two-hafted mastic handles were significantly different from one another between all ethnic groups, including the Gamo and Wolayta. Unfortunately, I have no measurements of the Oyda handles to compare to the Gamo *tutumas*. The Gamo *tutuma* (single open haft) socket is very flexible and can accommodate a variety of scrapers, which determine the height of the socket. Because of the great variety in the Gamo *tutuma* socket sizes, it was not significantly different from most other handle-sockets. However, it is significantly different from its nearest neighbors, the *zucano*s of the Gamo and the Konso handle sockets.

In the 1995 study, the Gamo unused and used-up scrapers were significantly different in breadth, length, and thickness from all other ethnic groups (Sidama, Gurage, Konso, and Hadiya) except for the Wolayta (Brandt and Weedman 2000). The Gamo and the Wolayta scrapers were similar in thickness, which may be a reflection of the fact that they are both Omotic speakers and that there are some Wolayta hide-workers who now live among the Gamo people. Unfortunately, there are no other collections of scrapers from Omotic societies to compare to the Gamo.

Informants' primary response to explaining why they use one handle and other hide-workers use another type was "*Woga,*" culture, or it is our tradition. An interethnic study of hide-working practices suggests that interethnic contact and influences may be partially responsible for the presence of two handle types among the Gamo people. This fusion of cultural traits suggests a process of ethnogenesis (Moore 1994). The idea behind ethnogenesis is that ethnic boundaries are flexible and dynamic. This process not only helps to explain the diversity concerning the Gamo material culture, but also the diverse cultural traits exhibited by the different Gamo subregions

and their association with other Omotic-speaking groups such as the Wolayta and Oyda, while also maintaining their own ethnic identity.

Intraethnic Subregional Relationships

The Gamo recognize three distinct geographical and regional differences (north, central, and south) within their own culture in terms of types of social and political leadership, the social roles of artisans, and material culture (see Chapter 3 for ethnographic details).

Handles

The distribution of the two types of Gamo hide-working handles is partially explained by the interethnic social relationships. A closer examination of the distribution indicates that it also reflects regional political and social differences, migration patterns, and marriage relationships.

Today, in general the hide-workers of the northern Gamo use a *zucano* handle, while the southern and central hide-workers use a *tutuma* handle (Figure 5-2). This generally reflects geography with the predominately highland regions of the southern and central Gamo using a *tutuma* handle and the lowland northern Gamo using a *zucano* handle (see Chapter 4). However, there are many exceptions, which render the association between environment and handle type inaccurate (see Chapter 4). In addition, although there are broad trends associating Gamo subregions (north, central, and south) with particular handle forms, there are some exceptions.

Eleven hide-workers use a *tutuma* handle in the northern region (see Appendix Table B-3). All of these hide-workers are young, and eight of them recently moved into the northern region (Borada) area from the central Gamo *deres* of Doko, Kogo, and Zada where *tutuma* handles are more commonly used. They continue to use *tutumas* because this is the handle their fathers taught them how to make and use. One hide-

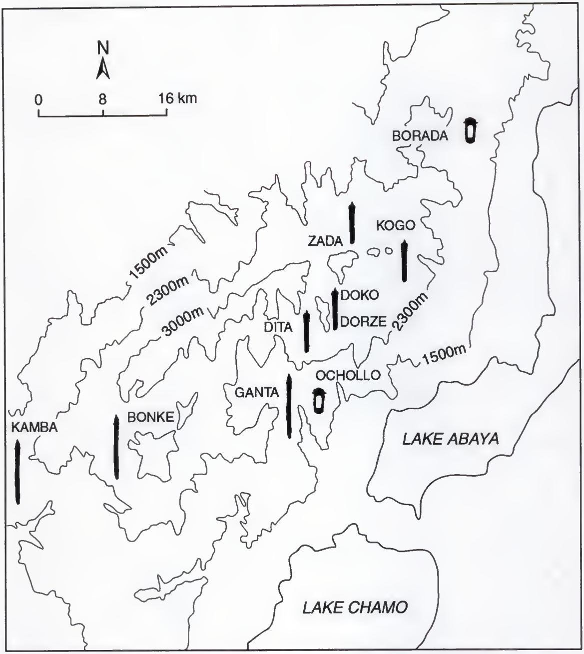


Figure 5-2: Map of the present distribution of Gamo handles.

worker (Yazah Bodeetay) uses a *tutuma* because his father did and his father moved to Borada from Doko. Milkana Hare states that he and his father both use a *zucano* and *tutuma* handles. Milkana's cousins who live in Pitay Mulato Borada have never used a *tutuma* handle. Milkana is very young (late teens to early twenties) and his father was not present for me to question concerning the lineage's history of *tutuma* and *zucano* use. The remaining hide-worker, Meecha Chama, who currently uses a *tutuma,* stated that another hide-worker in his village, who is deceased, taught him to use a *tutuma.* Reportedly there were four hide-workers from Zopano in Borada who also use a *tutuma* handle; however this information was second hand from Meecha Chama (who uses a *tutuma* himself), and I was unable to travel to Zopano.

Among the central Gamo, four elderly men (see Appendix Table B-4) stated that they used a *zucano* handle, as well as a *tutuma.* However, according to information from their sons and other hide-workers, they no longer scrape hides.

In Zada *dere* of the central Gamo, there are seven hide-workers who still use a *zucano*, and they all live in Leesha (see Appendix Table B-5). These seven individuals either married women, have a mother, or have a hide-worker friend in their village who is from or has strong connections to the northern Gamo people. They all state that the *zucano* is stronger and easier to hold and they prefer them to *tutumas.* Three of these individuals have connections in Mulato Borada and the other four are connected to Duma Ochollo.

Only 12 of the other 401 known highland Gamo hide-workers interviewed married women of the lowland regions (see Appendix Table B-6). Four of these hide-workers live in Shongalay Mogesa and use a *zucano* handle. Mogesa is at an elevation of 2300 meters right on the boundary of the two environmental zones, and the hide-workers collect the resources (i.e., mastic) themselves. These hide-workers are the only northern hide-workers who live at this high of an elevation. Two other hide-workers live in Dorze and married women from Ochollo. In both instances, the women are from

villages in Ochollo, where the elder hide-workers have died, and the younger hide-workers (their brothers and nephews) do not scrape hides. They never learned how to scrape hides from their fathers nor did they learn where to get the resources. The father-in-laws of three of the other hide-workers were either groundstone makers or smiths. Although, two of the hide-workers married women from the *baso* area their father-in-laws had moved to the area from the highlands and used a *tutuma*. There was only one hide-worker, for which I could find no explanation for why he still uses a *zucano* handle, while living in the highlands. His wife was from Kucha (Gofa ethnic group), and I do not know the father-in-law's occupation since I did not work in Kucha. I was told by many of the Zada hide-workers, however, that there are no hide-workers in Kucha; and that they themselves periodically travel and live there to work hides. The present use of social relationships among the central Gamo, such as in Zada, to obtain access to lowland resources (i.e., *zucanos* and mastic) led me to question if marriage patterns in the past had enhanced access to resources.

There are cultural regional differences that differentiate the southern, central, and northern Gamo peoples, which were reflected in the past use of *tutuma* handles in the south, *tutuma* and *zucano* use in central region, and *zucano* use in the north. It is possible that in the past the central Gamo married northern Gamo women more frequently to gain easier access to the lowland resources for hide-working. Today, however, the primary determinants in handle type use are economic change and availability of local resources (see Chapter 4), interactions with other ethnic groups, as well as social relationships such as marriage and friendship through which long distance resources are acquired inexpensively. The result is that today there is generally *tutuma* use in the south and central subregions and *zucano* use in the north.

Scrapers and Site Formation

The regional use of two handle types among the Gamo people leads us to question whether these handles and their sockets affect scraper morphology. We have already seen in the above discussion that Gamo scrapers are significantly different as a group from other ethnic groups in southern Ethiopia. It is clear that today the southern and central Gamo use a *tutuma* handle and the northern Gamo use a *zucano* type handle, which reflects regional economic and social (marriage and friendship) relationships. The question here is if there are internal handle type differences, do the scrapers used in the handles also differ based on handle type and thus reflect intra Gamo subregions and represent regional ideologies?

Procurement strategies reflect hafting differences rather than distance to the source. The *zucano*-using hide-workers of Mogesa and Amure villages walk two and four hours, respectively, to their sources. The *zucano*-users shape the parent chert material into a blank before carrying the materials to their home. *Zucano*-users are particular about the size of the flake they can use because their handle has a closed socket. Rather than bringing back a large chunk of raw material and risking making a lot of flakes that may not be useful because of their size, the *zucano* users opt to bring back scraper blanks. At the quarry, the *zucano*-users have an area within the river valley where they work in an approximately 2-meter diameter. It has some trees for shading and iron billets and large pieces of raw material for future reduction stored nearby. The ground in these areas is covered with debitage. They use a small cloth sack or pockets to carry ten to twenty scraper blanks back to the village. The number depends on the season and amount of hide scraping the hide-worker has for the next week or so. The caches are kept in cloth sacks or in wooden bowls inside the household, i.e., they are stored in secure areas away from playing children and trampling. The average cache contains four blanks with a range from one to eight. The final shaping takes place in the

household next to the hearth. The hide-workers rest the handle socket next to hearth to make the mastic malleable, and when the mastic softens a new scraper is placed within.

The hide-workers of Eeyahoo and Patela villages, who use a *tutuma* handle, also walk two to four hours, respectively to their sources. The *tutuma*-users will use most flakes that they can get a sharp edge on. Shaping of the laterals is not necessary because the haft is open. Furthermore, the *tutuma* handle is more versatile and can hold thicker scrapers than *zucano* hafts. I have recorded scrapers up to 4.3 cm thick in *tutuma* hafts. Those that use a *tutuma* handle bring back large chunks of chert material and use almost all the reduced flakes for scraping. The *tutuma* hide-worker will inspect a piece for its quality and may reduce it to a manageable size no larger than 20 by 20 cm to bring back to the household. Reduction of large pieces is conducted at the location it was found and not taken to a reduction area. The reduced nodule is placed in a bag or pocket to be brought back to the village. The *tutuma* hide-workers store the nodules outside on the ground within their enset gardens, often near to where they scrape hides. Although, one hide-worker places his nodules in a hole in a cut bank wall near his house. The unused scrapers and debitage are kept in a broken ceramic bowl, also left outside. When the bowl becomes full of lithic waste and used-up scrapers, the hide-worker throws it into the enset garden. The hide-worker will use almost any flake that has a good edge. When a new scraper is needed in the haft, the hide-worker will either select a flake already made or will produce eight to ten new flakes off of a nodule and select one. There is no shaping of the flake to fit it into the haft, since the haft is an open one. Sharpening may occur on the edge either before or after it is hafted, depending on the whim of the hide-worker.

Zucano scrapers are shaped on the distal, proximal and one or more lateral edges. Their unused form resembles what archaeologists refer to as formal tools (Figure 5-3). In contrast, there is no real shaping of a *tutuma* scraper. The distal tip simply is sharpened (Figure 5-3). Moreover, they resemble in their unused form what

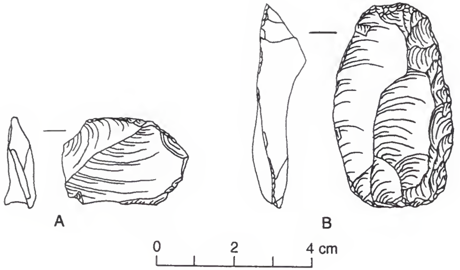


Figure 5-3: Illustration depicting the differences between unused *tutuma* (A) and *zucano* (B) scrapers.

we would call utilized flakes, expedient tools, or informal tools. In t-tests the length, distal thickness, breadth/length, thickness/length ratio, retouch length, and proximal thickness are all significantly different when comparing unused *zucano* and *tutuma* scrapers (see Appendix Table C-7). However, there is no statistically significant difference between the medial breadth, weight, and distal edge angle of unused *zucano* and *tutuma* scrapers.

Although there is no statistical difference between the medial breadth of unused *tutuma* and *zucano* scrapers, this changes with use. The mean breadth of used-up *zucano* and *tutuma* scrapers is statistically significantly different from one another (see Appendix Table C-8). This is probably because *tutuma*-users make use of the laterals for scraping and hence reduce them for resharpening, which reduces the original breadth of the tool. There is also a statistical difference in the other measurable variables of used-up tutuma and zucano scrapers (see Appendix Table C-8). Only weight and distal edge angle are not statistically different.

Unused scrapers could easily be distinguished based on handle type because of the formal nature of *zucano*-hafted scrapers and the relatively informal nature of *tutuma*-hafted scrapers. However, because there is only a small difference in the morphological measurements of used-up scrapers (see Appendix Table C-8) it would be difficult to determine a visual difference between the two once they are used-up. It is important to look at other attributes to try to distinguish used-up scrapers based on hafting type.

I asked the hide-workers to sort a pile of scrapers in terms of handle type. In the *tutuma*-using village of Eeyahoo, hide-workers stated that thicker scrapers were used in *tutuma* handles and thinner ones in *zucano* handles. This distinction resulted in a forty-one percent correct assessment of *zucano* scrapers and a seventy-eight percent correct assessment of *tutuma* scrapers. In the village of Amure, which uses a *zucano* handle exclusively, they claimed that *tutuma* scrapers were longer and that the *zucano* proximal end is shaped to fit in the handle. This resulted in their being fifty percent accurate on

the sorting of scrapers in terms of handle type. The *zucano*-using Mogesa hide-workers were one hundred percent accurate and stated that only those scrapers that were long and had been modified on the laterals and the proximal (which is done to fit into the socket) were *zucano* scrapers.

Based on the observation of the Mogesa hide-workers, I examined the location and type of retouch as a basis for distinguishing used-up *zucano* and *tutuma* scrapers from one another. Scrapers placed in *zucano* handles were retouched or shaped on one or more lateral sides 64 percent of the time. Once the working edge of a *zucano* scraper is used-up, the scraper is replaced. Therefore, there are usually shaping or resharpening scars on all sides of the *zucano* scrapers. *Tutuma* scrapers are not shaped on the laterals before use and hafting. However, I was given many scrapers by *tutuma*-users which were considered unused, because an edge was unused even though other edges were used-up (72/361 or 20 percent). When the utilized edge of a *tutuma* scraper is used-up, often (49 percent of the cases) the scraper is removed and one of the lateral edges or the proximal edge is refitted to be used as the next scraping edge. The unused scrapers in the *tutuma* handles are never retouched on the laterals and/or proximal edges unless they are partially used. The result is that the morphology of scraper retouch location is similar in used-up scrapers for both handle types (Figure 5-4). However, when the length of the retouch is compared between the used laterals of the *tutuma* scrapers and the unused but shaped laterals of *zucano* scrapers there is a significant difference. The lateral and proximally used edges of the *tutuma* scrapers are twice as long in retouch length as their *zucano* counterparts (Table 5-2).

I also noted there were differences in the breakage patterns and the presence of undercutting and dorsal ridge reduction when comparing the scrapers of the two handle types. In a sample of 382 *tutuma* used-up scrapers (Patela and Eeyahoo), only 10 were broken (2.6 percent). *Tutuma* scrapers broke at the medial, distal tip, and in several instances into three parts (Figure 5-5). In contrast, the scrapers hafted in *zucano*

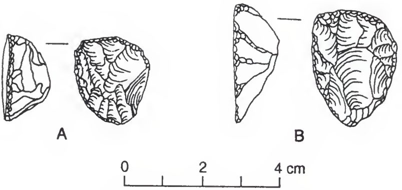


Figure 5-4: Illustration depicting the differences between *tutuma* (A) and *zucano* (B) used-up scrapers.

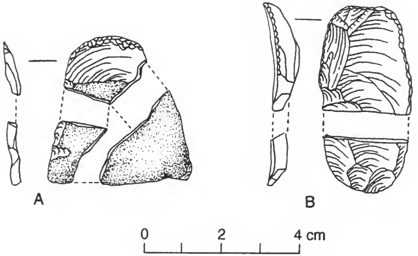


Figure 5-5: Illustration depicting the different breakage patterns of *tutuma* (A) and *zucano* (B) scrapers.

Table 5-2: Differences in the retouch scar lengths on *zucano* and *tutuma* hafted scrapers

Edge Modified	*zucano* Scrapers Mean Length cm	*tutuma* Scrapers Mean Length cm
Distal Used	1.00 (n=487)	1.1 (n=198)
Left Lateral Unused	0.39 (n=133)	-
Left Lateral Used		0.81 (n=38)
Right Lateral Unused	0.40 (n=151)	-
Right Lateral Used	-	0.80 (n=36)
Proximal Unused	0.39 (n=60)	-
Proximal Used	-	0.84 (n=17)

handles (Amure and Mogesa) broke only slightly more frequently (32/492) at 6.5 percent, but all but one of these scrapers broke at the medial (Figure 5-5). The latter is probably the result of the mastic holding the proximal part of the tool into the socket. The absence of mastic fixing in the *tutuma* handle allows more ways for the tool to break.

Two other elements that seem to be the result of hafting occurred only on scrapers that were used in the *zucano* or closed socketed mastic handles. The creation of an undercut or exaggerated step fracturing occurred when the mastic holds the upper part of the material in place but the resharpening force removes the under side (See Chapter 2, Figure 2-4 (A) for illustration). During retouch, the mastic securing the dorsal-back into the socket occasionally caused a situation in which stone was removed under the dorsal backing, forming an undercut. This occurred on 2.8 percent (14/492) of the *zucano*-hafted scrapers, but not on any of the *tutuma* scrapers. Secondly, if the dorsal ridge of a scraper were too thick for a closed haft, sometimes the hide-worker would reduce it resulting in flake scars along the dorsal ridge of the tool. The intentional removal of material from the dorsal ridge of many *zucano*-hafted scrapers occurred in 3.5 percent (33/940) of the assemblage, but none of the *tutuma*-hafted scrapers. I

examined a sample of the scrapers using a 20X hand-lens and saw no striations, lateral crushing, or dorsal crushing.

I also looked at the dorsal scar pattern, planform, platform location, and cross-section of each scraper, to determine if there were differences between the scrapers of the two handle types. The dorsal scar patterns of unused *zucano* is dominated by a radial pattern (see Appendix Figure D-5). Unused *tutuma* scrapers have the most dorsal scar pattern variation including parallel, radial, irregular, and opposed forms. The presence of opposed and radial patterns is unexpected as *tutuma* scrapers are rarely shaped before hafting and they do not seem to be from prepared cores. A chi-square test confirms that there are significantly more zucano-hafted scrapers with a radial dorsal scar pattern (see Appendix Table C-9). Both the used-up *zucano* and *tutuma* scrapers predominately have a radial dorsal scar pattern due to the shaping and/or use of the laterals and the proximal edges

Planforms are dominated by short quadrilateral, short elliptical, and long oval types (see Appendix Figure D-6). *Tutuma* unused scrapers are dominated by short quadrilateral planform (79 percent compared to 46 percent of *zucano*s). Unused *zucano* scrapers exhibit a wider range of planforms, which may be the result of shaping the laterals and proximal to fit in the socket. A chi-square test confirms that there is a significantly wider range of scraper planforms associated with *zucano* hafted scrapers than *tutuma* hafted scrapers (see Appendix Table C-10). Used-up *tutuma* scrapers though exhibit a wider range of planforms, which probably is a result of the extensive modification applied to *tutuma* scrapers during use.

Although, both scraper types exhibited a wide range of cross-sections, the *tutuma* scrapers had a higher percentage of lenticular cross-sections (45 percent compared to 27 percent) and the *zucano* scrapers demonstrated a higher percentage of plano-convex cross-sections (38 percent compared to 17 percent) (see Appendix Figure D-7). The latter is probably the result of shaping the edges for hafting, which would

create steeper edges. A chi-square test confirmed this significant difference between the cross-sections of unused *tutuma* and *zucano* scrapers (see Appendix Table C-11).

An interesting pattern emerges when the platform type and location is explored (see Appendix Figure D-7). Thirty-six percent of the *tutuma* unused scrapers have remnants or whole platforms compared to twenty-four percent of the *zucano* unused scrapers. Most platforms on the unused *zucano* scrapers (76 percent) were not present or trimmed away compared to unused *tutuma* scrapers (64 percent). Unused *tutuma* scrapers exhibit a wider range of platform locations, which supports earlier statements that *tutuma*-users utilize almost any flake type with a sharp edge. I believe this difference can be explained by the fact that before use, *zucano* scrapers are shaped more causing the more frequent removal of the platform and signs of its original location than *tutuma* scrapers. Unfortunately, a chi-square test determined that these differences were not significant (see Appendix Table C-12).

Finally, hafting type also influences site formation process, in terms of scraping location and primary discard location (Figure 5-6 and Figure 5-7). The location of hide scraping within a household compound is dependent on the environmental location of the hide-worker village. Since the distribution of current handle types is also partially based on environmental location, scraping location and handle type are linked. In the *tutuma*-using highlands, the houses are framed with bamboo and covered with thatch. Those hide-workers who live in the highland region claim that when scraping, the frame shakes and presses against the house and causes it to loose its thatching and become unstable. So they tend to scrape outside the house on a frame located within their enset garden. In the *zucano* using lowland region, the houses are constructed with mud and wood walls and topped with a thatched roof. The lowland hide-workers claim they scrape inside because the sun dries the hides out too quickly if they work outside. Consequently, they have a frame located inside their household and are not concerned with the frame shaking loose the wall thatching.

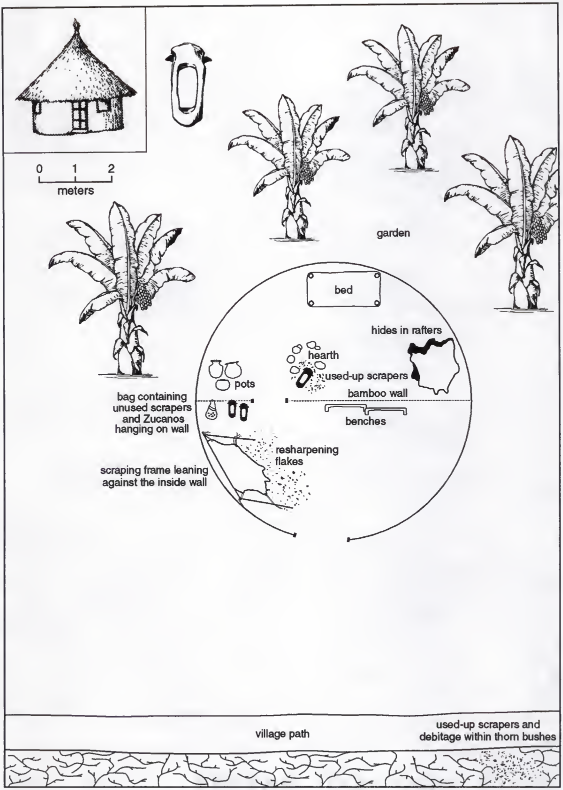


Figure 5-6: Plan map of a *zucano*-using household illustrating activity and storage areas associated with hide-working practices.

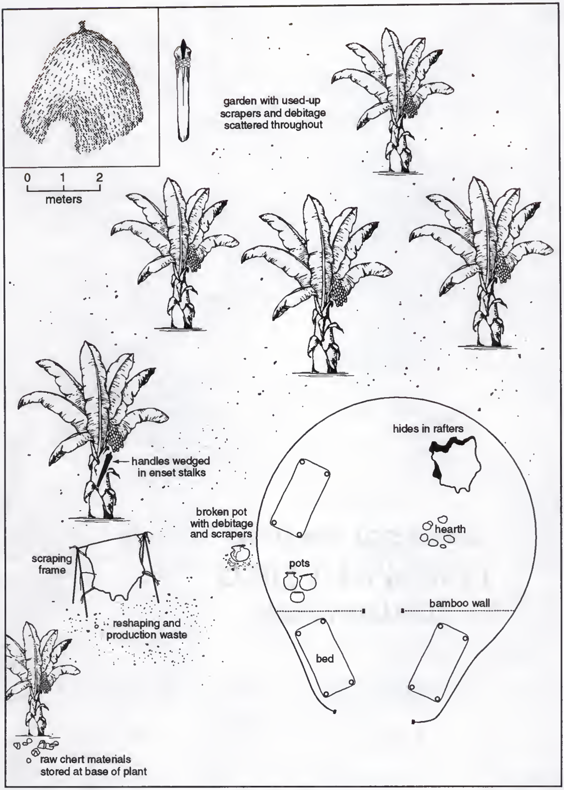


Figure 5-7: Plan map of a *tutuma*-using household illustrating activity and storage areas associated with hide-working practices.

Zucano scrapers need to be removed with the aid of a hearth to make the mastic malleable for scraper removal. *Tutuma* scrapers do not require a hearth for scraper removal. Thus, *zucano* scrapers can often be found in the household near the hearth or near the inside-scraping frame. The *tutuma* scrapers are rarely found in the household, but more often within the enset garden near the outside scraping frame. The Gamo scrapers and handles express variation, which reflects socio-political regional differences. The two handle types represent a north and south division representing internal cultural differences. In turn, the use of two handle types results in the production of two different scraper morphologies and differences lithic household spatial distributions (Table 5-3).

Table 5-3:Summary of the scraper and site formation differences between Gamo subregions.

	South and Central subregions	North subregion
Past Handle Type	*zucano* and *tutuma*	*zucano*
Present Handle Type	*tutuma*	*zucano*
Unused Scraper Morphology	informal/expedient	formal
Used-up Scraper Morphology	3 or more edges used	1 edge used
Scraper Shaping Location	at home	at quarry
Scraper Storage Location	outside home	inside home
Scraping Hide Location	outside home	inside home
Scraper Removal Location	outside near frame	at hearth
Final Discard of Scraper	in garden	in lithic trash pits

Intraethnic *Dere* Relationships

Each Gamo region is made up of two or more ritual-political districts or *deres*. As stated in Chapter 1, traditionally there were ten political divisions or *deres* among the Gamo people: Kamba, Bonke, Doko, Kogo, Dorze, Ochollo, Ganta, Borada, Zada, and Dita.

In scraper pile sorting tests, the hide-workers stated that they did not know about scrapers of other *dere*s and so could not select scrapers based on *dere* membership. Although the hide-workers travel to two or more markets a week and often meet hide-workers of other *deres,* they more frequently socialize with hide-workers of the same *dere* who more regularly visit the same markets. They also do not carry with them their finished scrapers nor exchange scrapers in blank, unused, or used-up forms. However, *dere* membership is very important to the *degala*, as it is within this context that he travels and performs rituals (healer, circumcision, and messenger) in exchange for his economic and social security. It is also the community level on which *degala Halakas* and elders meet to resolve issues that concern them such as impending marriages, farming, disputes, and other grievances.

Handles

An analysis of handle length and width dimensions within Gamo indicates that there are differences in the size of each handle type in each of the *dere*s studied. Statistical tests were not possible because of the small sample size for each *dere*. I measured all the handles in Doko, Dorze, and Ochollo, as the number of hide-workers living in these *dere*s is extremely low. In Kogo and Doko, *zucanos* are no longer used, but a few individuals still had them around. There are no measurements for Kamba and Ganta because these hide-workers use an iron axe to scrape hides. Although some Kamba and Ganta hide-workers use a *tutuma* handle, I met them at the market place, and they did not have their handles with them for me to measure. In addition, I interviewed Dita hide-workers in the Zada and Doko Mesho markets and so do not have handle measurements for them.

Figure 5-8 illustrates that the handles express exchange relationships between the different *deres*. In the past, Kogo, Zada, and Doko hide-workers purchased at the Kogo Ezo market their mastic and *zucano* handles, which originally came from Borada.

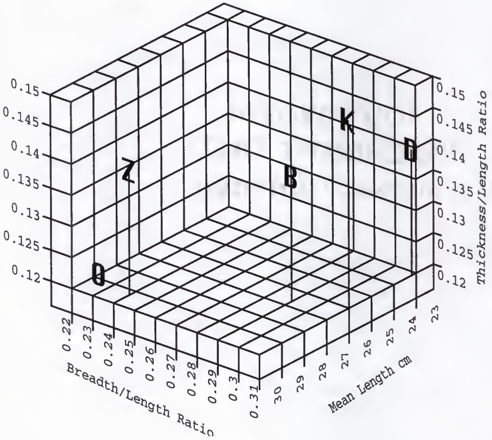
This may explain why the dimensions of the Borada, Doko, and Kogo *zucano* handles cluster more closely with each other than with the Ochollo handles. The Zada hide-workers who currently use *zucano*s get their mastic and handles from Ochollo and Borada. The Zada *zucano* handles are morphologically between the Borada and Ochollo clusters. The Ochollo *zucano* also is different from the Borada *zucano* because it has only a single socket. The *zucanos* used in Zada, Kogo, and Doko also have two sockets.

No one in Ochollo uses *tutuma*s. However, individuals who have recently moved to Borada from Doko, Zada, and Kogo still use *tutumas*. They continue to use *tutumas* because it was the handle that they learned to use from their father. Figure 5-9 illustrates that there are distinctly two types of *tutuma* handles, i.e., Bonke and a cluster representing the remaining *deres*. The Bonke handle is much longer than other *tutuma*s and this is probably a regional expression. As stated above, I do not have measurements for the other two southern *dere*s, Kamba and Ganta. However, they did state that their handles were long like the Bonke handles, rather than short like the Doko handle. There is a strong clustering of Borada, Zada, Kogo, Doko, and Dorze *tutuma*s that reflects a central Gamo expression in hafting. The Borada *tutuma* more closely cluster with the central than the southern *dere*s because the individuals who have *tutuma*s in Borada moved there from the central Gamo region.

The socket size of a handle is potentially important for influencing stone tool morphology. It was not possible to measure the socket depth of the *zucano* type handle because of the presence of either a scraper in the socket or mastic filling the socket. The depth of the *tutuma* socket generally extended half the length of the *tutuma*, as it is simply a transverse split in the piece of wood. The mean breadth/length ratio of the Borada *zucano* sockets are within the size range of Doko, Zada, and Kogo, areas which previously obtained their *zucanos* from Borada (Figure 5-10). The Doko and Kogo *tutuma* sockets are similar in size to the Borada *tutuma* sockets (Figure 5-11). This may

be an expression of the fact that the individuals who use *tutumas* in Borada today recently moved there from Doko and Kogo.

Although the sample sizes are very small in some cases, I attempted to compare the sockets in a two-sample/tailed t-test. The t-tests indicated significant differences

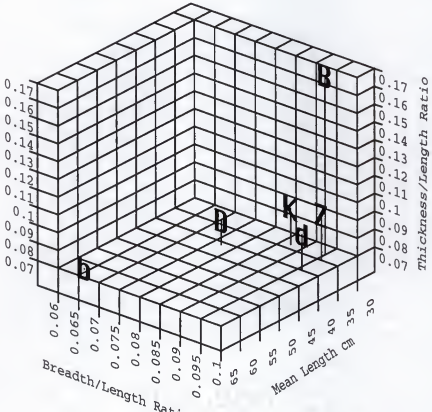


Legend
B Borada (n=59) Z Zada (n=6) **K** Kogo (n=5) **D** Doko (n=2) **O** Ochollo (n=5)

Figure 5-8: Graph illustrating the differences between *dere zucano* handles.

between most *zucano dere* handle sockets except for those between 1) Borada and Kogo and 2) Zada and Kogo (see Appendix Table C-13). As stated earlier, the Zada and Kogo people purchased their handle in the past from Borada hide-workers, which may

explain why the sockets are similar. The Doko and Ochollo sample sizes were too small to render an accurate statistical test. In terms of the *tutuma* hafts, there is not a significant difference between any of the *dere tutuma* hafts (see Appendix Table C-14). This may be because haft size of the *tutuma*s is extremely variable, because the height depends on the thickness of the inserted scrapers.



Legend
B Borada (n=11) **Z** Zada (n=44) **K** Kogo (n=52) **D** Doko (n=24)
d Dorze (n=16) **b** Bonke (n=7)

Figure 5-9: Graph illustrating the differences and similarities of *dere tutuma* handles.

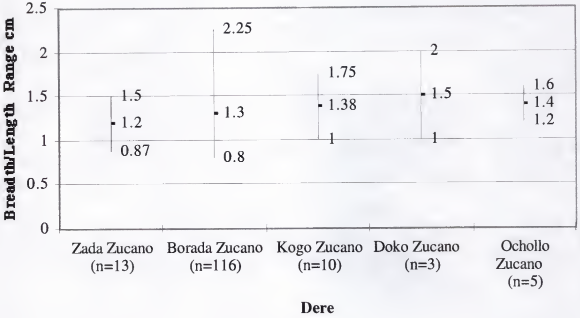


Figure 5-10: Graph comparing the mean breadth/length ratio ranges of *zucano* sockets among the Gamo *deres*.

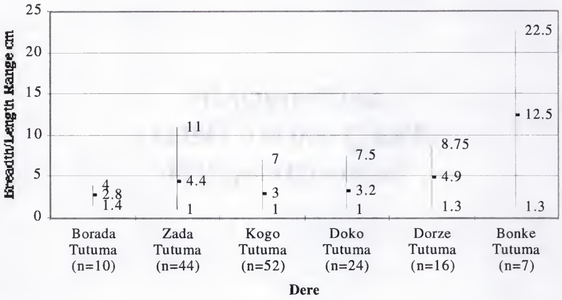
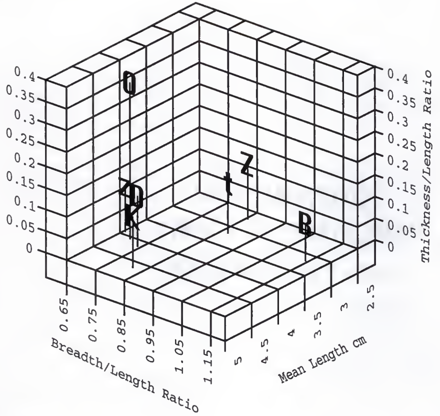


Figure 5-11: Graph comparing the mean breadth/length ratio ranges of *tutuma* sockets among the Gamo *deres*.

Scrapers

A comparison of the unused scraper morphology in terms of breadth/length ratio, thickness/length ratio, and mean length indicates a distribution based on regional distinction (north, central, and south) and exchange relationships (Figure 5-12, see Appendix Table C-15 for data). Bonke unused scrapers are isolated from other unused scrapers representing a distinct type. Bonke alone represents the southern region of Gamo, since I did not collect scrapers from Ganta and Kamba. The Ochollo *zucano*, Borada *zucano*, Kogo *tutuma*, and Dorze *tutuma* unused scrapers cluster closely together. Dorze and Kogo hide-workers obtained their chert raw materials from Borada and Ochollo and this may explain the similarity. Furthermore, Borada *tutuma* scrapers are located in length between Zada and Doko and Kogo scrapers. This is interesting in light of the fact that individuals using *tutuma* handles in Borada are from these other areas of Gamo.

T-tests (see Appendix Table C-16) indicated a significant difference between all unused scrapers in terms of *dere* membership especially concerning breath-length ratio, thickness/length ratio, retouch scar length, and distal thickness. However, there was not a statistical difference between the mean length of Dorze and Kogo scrapers. Dorze hide-workers, from whom my collection was gathered, said that they were originally from Doyna, which is part of Kogo. Unfortunately, no other hide-workers in Dorze currently use stone to make another comparison. This may provide an explanation for the similarities in the scrapers between these two *deres*. The statistical similarities in length of the Ochollo and Borada *zucano* and breadth of the Ochollo and Borada *tutumas* may be a reflection of similar handle types in the former and subregional membership in both instances. In addition, the Dorze and Ochollo scrapers have a similar mean length. This may be explained by raw material size constraints, as the hide-workers from both these *deres* share a similar raw material source along the Baso River.



Legend
South - **B** Bonke (n=27)
Central - **K** Kogo (n=30) **Z** Zada (n=292) **D** Dorze (n=31)
North - **t** Borada *tutuma* (n=82) **z** Borada *zucano* (n=473) **O** Ochollo (n=40)

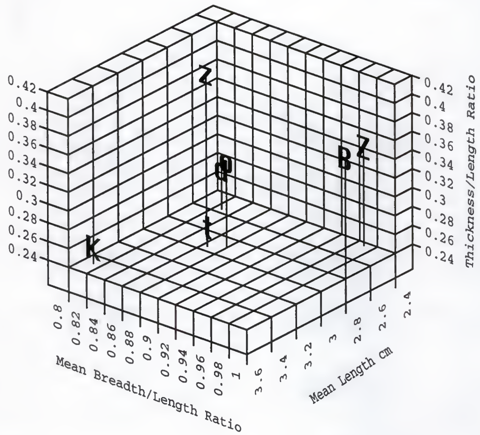
Figure 5-12: Graph illustrating the clustering patterns of *dere* unused scrapers.

I have no explanation for the similarities between the breadth of Bonke and Kogo unused scrapers and the similar length of Bonke *tutuma* and Borada *tutuma* unused scrapers. When the breadth-length ratios and distal thickness are statistically compared, there are significant differences between all *dere*s. It should be clear that although there are some similarities expressed with individual scraper traits between different *dere*s, in no instance are there two *dere*s that have the same dimensions for length, breadth, and thickness. Breadth-length ratio, distal thickness, retouch scar length, and thickness/length ratio of unused scrapers would seem to be a good indicator for discerning local political relationships.

The graphic illustration of the used-up scrapers suggests three clusters of used-up scrapers 1) Kogo; 2) Zada and Bonke; and 3) Dorze, Ochollo, and all Borada scrapers (Figure 5-13, see Appendix Table C-17 for data). The similarity between Borada and Ochollo used-up *zucano* and *tutuma* scrapers suggests that there is a similar mental template or a shared understanding of when a scraper is used-up, which does not rely on handle type.

However, the Borada used-up scrapers also cluster with the Dorze used-up scrapers and the Bonke and Zada used-up scrapers cluster. I know of no social relationships, which would cause this clustering. However, if we look at a map of the political districts (see Chapter 3, Figure 3-3), we should note that Kogo is nearest to Zada and Borada. These *deres* may have different scraper morphologies to differentiate themselves most strongly from their nearest neighbor. The clustering of Dorze with Borada and Zada with Bonke may indicate that signaling is not as necessary between these groups because they are not geographic neighbors. Furthermore, Ochollo has been at war in the past with both Bonke and Kogo and does not cluster with either one of them. Despite previous disputes between Ochollo and Dorze, their scraper morphology is similar which may again be a reflection of raw material source along the Baso River. Surprisingly, the mean length of the Kogo used-up scrapers is longer than the other *dere*s. The Kogo sample is the only one I have which obtains its resource through trade and not directly at the quarry, which may affect how long a tool is used before discarded. The Kogo hide-workers may discard their scrapers after a shorter time of use than other hide-workers because the material is easier to obtain. Hence, it requires less effort to obtain scraper materials at the market where one goes anyway for other products, than to make a special trip to the stone quarry.

A comparison of the used-up scrapers in t-tests (see Appendix Table C-18) indicate significant differences between the *dere* scrapers, except for: 1) mean length of



Legend
South - **B** Bonke (n=29)
Central - **K** Kogo (n=32) **Z** Zada (n=223) **D** Dorze (n=24)
North - **t** Borada *tutuma* (n=187) **z** Borada *zucano* (n=565) **O** Ochollo (n=22)

Figure 5-13: Graph illustrating the clustering patterns of *dere* used-up scrapers.

Zada and Dorze, Bonke and Ochollo, Borada *tutuma* and Ochollo, Ochollo and Borada *zucano*; 2) mean breadth of *tutuma* and *zucano* Borada and Ochollo scrapers; and 3) distal thickness between Dorze and Borada *tutuma*s. For most of these, I have no explanations for their similarities. Although Ochollo and Borada may be similar in used-up length because they share a similar handle type- the *zucano*. Once again, though it should be clear that although there are some similarities expressed between the morphologies of scrapers from different *dere*s, in no instance are their two *dere*s that have the same dimensions for length, breadth, and thickness. In addition, like the

unused scrapers there is a consistent significant difference between the breadth/length ratios of all the used-up *dere* scrapers. There was not a significant difference concerning the edge angles and weights between the different *deres*.

I also compared the macro-morphological differences such as: planform, dorsal scar pattern, and cross-section of the unused and used-up scrapers in terms of *dere* membership. I wanted to see if there were visual differences between the clusters of unused and used-up scrapers, which were not statistically significant in terms of morphological measurements in length, breadth, and thickness. Primarily there were not significant differences between: 1) the unused and used-up lengths of Borada *tutumas* and *zucano* scrapers and Ochollo scrapers and 2) the Dorze and Ochollo scrapers (Table 5-4).

Table 5-4: Summary comparing the significant scraper for identifying *dere* membership.

***Dere* comparisons**	**Similar Unused metric measurements**	**Dissimilar Unused Macro-morphology**	**Similar Used-up Metric measurements**	**Dissimilar Used-up Macro-Morph-ology**
Bonke & Borada tutuma	length	dorsal scar	-	-
Bonke & Kogo	breadth	dorsal scar	-	-
Kogo & Dorze	length		-	-
Ochollo & Dorze	length	planform	-	-
Ochollo & Borada Zucano	length	planform	length	-
Ochollo & Borada Tutuma	breadth	planform	length & breadth	-
Ochollo & Bonke	-	-	length & breadth	-
Dorze & Borada tutuma	-	-	distal thickness	-
Dorze & Zada	-	-	length	dorsal scar

The dominate planform shape for all unused and used-up scrapers is short quadrilateral, though Bonke and Borada *tutuma*s have more short quadrilateral scrapers, and Zada and Borada *zucano* short elliptic scrapers (see Appendix Figures D-8 and D-9). The only two striking differences are between Ochollo *zucano* and Borada *zucano* unused scrapers, which is interesting in light of their statistically similar measurements discussed above. The Ochollo *zucano* scrapers tend to have a long triangular shape and the Borada *zucano* scrapers have about an equal percentage of long oval and short quadrilateral shapes. In addition, the Dorze have a different planform from the Ochollo as the former has more short quadrilateral form. Therefore, although they may not be statistically different in terms of length, they are different in their planform morphology.

In terms of dorsal scar patterns, radial, irregular two-directions, and opposed dominate the *tutuma* scrapers of Dorze, Kogo, Zada, and Borada (see Appendix Figure D-10 and D11). Opposed and irregular patterns are especially dominant among Dorze, Kogo, and Borada *tutuma* scrapers. While a radial pattern is very dominate among Bonke *tutuma* scrapers and the *zucano* Ochollo and Borada scrapers. The dorsal scar pattern provides another avenue for discerning unused Bonke scrapers (radial) from unused Borada *tutuma* (opposed and irregular two-direction).

Lastly, a comparison of the cross-section based on *dere* membership indicates a dominant lenticular, triangular, and plano-convex morphology for unused scrapers and used-up scrapers (see Appendix Figures D-12 and D-13). The scrapers of Bonke are more plano-convex while the Borada *tutuma* scrapers are more lenticular and triangular in cross-section. Ochollo scrapers are lenticular, Borada zucano scrapers are more plano-convex, and Borada *tutuma* mostly triangular. Thus, although there are similarities in Bonke and Borada *tutuma* length, Ochollo and Borada *zucano* length and Ochollo and Borada *tutuma* width, cross-section form differentiates them from one another.

The handle morphology of the different *deres* cluster, in terms of regional membership and exchange relationships. For instance, Kogo, Doko, and Borada *zucano* handles share a similar morphology, and Kogo and Doko handles were purchased from makers in the Borada *dere*. In addition, Borada *tutuma* handles are most similar to those from Kogo, Zada, and Doko, where the owners of the Borada *tutuma*s came from. Furthermore, the socket breadth/height ratio of the Borada *tutuma*s is more similar to those of Kogo and Doko than those from Dita or Dorze. Scrapers are differentiated based on *dere* membership, and statistically significantly different in terms of breadth/length ratio, thickness/length ratio, distal thickness, and retouch scar length. In general, *dere* scrapers are significantly different in terms of their mean breadth, length, and thickness measurements. There were some similarities however, as the unused Borada and Ochollo scrapers are not statistically different in unused and used-up length and unused breadth, they are different in terms of their planform and cross-sections. Cross-section also differentiates Dorze and Ochollo scrapers. In addition, dorsal scar pattern discerns Bonke from Borada *tutuma* scrapers. Most significantly is a statistical difference of the breadth/length ratio corresponding to each *dere* for both unused and used-up scrapers suggesting a shared mental template concerning scraper form on the *dere* level.

Discussion

Scraper, handle, and socket morphologies and spatial locations reflect the ethnic, subregional, and *dere* membership of their makers. Although there have been no other ethnoarchaeological studies focusing on group membership and stone tools, ethnoarchaeological studies of pottery (Hodder 1977, 1982) and spear points (Larick 1985; Wiessner 1983, 1985) also demonstrate ethnic and language group cohesion as expressed in material culture. In addition, an examination of the historical record indicates that different ethnic groups around the world had different cultural rules that

govern technological strategies resulting in a variety of methods used for achieving the same ends, such as scraping hides. Historically, a variety of mediums have been used to haft stone scrapers including bone, antler, horn, ivory, and wood in North America (Ewers 1930; Hiller 1948; Lowie 1935:74-79; Mason 1889; Murdoch 1988 (1892):295-298; Nelson 1899:116-117; Nissen and Dittemore 1974), Australia (Aiston 1929, 1930; Allchin 1957; Gould 1980:128-129; Gould et al. 1971; Tindale 1965:133-135; White et al. 1977), and Africa (Clark 1958b; Deacon 1966; Rudner 1979). They also used different methods to bind the tools in the socket including: filling the socket with a pitch/resin of tree gum and grasses, packing the socket with hide/canvas, and lashing the handle externally with pieces of hide and sinew.

Similarly, a comparison of southern Ethiopian hide-working practices demonstrates difference in hafting and scrapers divisible in terms of ethnic group membership. The Gamo handle, sockets, and scrapers are morphologically distinct from Cushitic and Ethio-Semitic ethnic groups, but share similarities with other Omotic ethnic groups (Brandt and Weedman 2000). The hide-working materials of Omotic societies are used for many other occasions especially concerning marriage, initiation, and death ceremonies in which the role of the hide-worker as mediator is exacerbated. This shared ideology concerning the role of hide-workers in Omotic society is reflected in a similar material culture. Hence, the presence of two distinct handle types among the Gamo is in turn partially the product of interaction with other Omotic ethnic groups. The Gamo southern and central hide-workers use a *tutuma* handle like their Omotic speaking neighbors to the west, the Oyda. The Gamo northern hide-workers use a *zucano* handle like their Omotic speaking neighbors, the Wolayta. Yet, statistically the morphological measurements of the handles and hafts are different.

In addition, the Gamo hide-workers express an overall scraper morphology that was significantly different from other ethnic groups, suggesting the presence of a Gamo shared mental template (Brandt et al. 1996; Brandt and Weedman 2000). In contrast to

my findings, Meltzer (1981) argues that a morphological (width, length, thickness, and tool weight) cross-cultural comparison of North African and Eastern North American scraper assemblages indicates that modification is not sufficient to change overall tool morphology expressing cultural differences. Meltzer (1981) states that "endscraper morphology is simply a reflection of functional variability, and thus it will be relatively uniform (ahistorical) through time and space" (326). However, other archaeological studies of stone tools, including scrapers, emphasize differences in ethnic, regional, and local political districts but form no consensus concerning which attributes are important for discerning social representation and at which level (Bordes 1961, Close 1989, Sackett 1982b). For instance, Close (1989) used retouch types on backed bladelets to discern social groups in Late Paleolithic Nile Valley assemblages. Bordes (1961, 1973) examines variation in the cross-section and planform of tool shapes to determine cultural differences during the Mousterian. Yet, Sackett (1982b), examining tools from the same period argues that only a multivariate analysis is diagnostic of ethnicity.

Many archaeological studies of intracultural or regional and local political districts (Ericson 1984; Johnson 1996; Micheals 1989; Nassaney 1996) focus on local access to resources and trade rather than differences in identity to explain lithic variation. The emphasis is on lithic reduction sequences rather than on tool attributes and morphology. However, a combination of spatial analysis, reduction sequences, and tool attributes provides a multivariate approach to understanding the expression of identity in material culture.

The Gamo use two different scraper types to do the same work, i.e., scraping cattle hides. This is remarkable because it suggests that stone tools used within a single culture for the exact same function can express significant variation based on internal social differences. Gamo scraper morphology is discernable in terms of a north and south subregional membership. Today, the distribution of handle types in Gamo society differentiates the southern and central Gamo *tutuma*-users from the northern Gamo

zucano-users. The regional hafting differences provide for the presence of two distinct scraper types and site formation processes. The scrapers made for closed-hafted mastic handle, *zucano*, had an unused formal scraper morphology and sometimes exhibited reduction of the dorsal ridge to fit the scraper into the haft. *Zucano* scrapers are shaped at the quarry and kept safely inside the household. In contrast, the scrapers of the open-nonmastic *tutuma* handles expressed an informal unused morphology with little if any shaping of the flake. The *tutuma* scrapers are shaped at the household right before use, and the nodules of raw material are kept outside the household. The used-up *zucano* scrapers sometimes have an undercut as the result of resharpening in a mastic haft. If they break, they usually break along the medial plane. Furthermore, only a single edge, the distal, is used for scraping and resharpening. The shaped lateral retouch scars of the *zucano* are much shorter in length than the retouch scars left on edges that have been used and resharpened on *tutuma* scrapers. The used-up *tutuma* scrapers never have an undercut on the used edge and if they break, they do so in a variety of patterns. The hide-workers also often use several different edges of the *tutuma*-hafted scraper to work the hide. In summary, subregional hide-working practices among the Gamo are expressed in distinctive handles, scrapers, and household spatial distribution of stone materials.

However, morphological differences in hafting and scrapers go beyond expressing Gamo ethnic and subregional groups, they also express *dere* membership. Geographical features such as mountain ridges and rivers separate these internal ritual-political districts. The *dere* handles cluster in terms of subregions and social and economic relationships. In no instance, were all the scraper attributes of one *dere* the same as the entire scraper attributes from another *dere*. Most importantly all *dere* scrapers were significantly different from one another in terms of the shape defining ratios of breadth/length and thickness/length.

The concept of bounded homogeneous cultures has led archaeologists to turn to functional explanations when they are faced with intracultural material variation. However, stone tool analysis points to the importance of examining internal social variation as a normal aspect of ethnicity. Furthermore, social group membership is not simply expressed within a single visual or metric attribute of a stone tool, but rather in the stone tool's shape defining attributes and its location within the landscape. When searching for explanations of intracultural variation in stone tools, archaeologists should consider social group membership and function to be equally important. A scale of analysis methodology allows archaeologists to evaluate the roles of both style and function in material culture.

CHAPTER 6
KINSHIP AND LOCAL GAMO IDENTITIES

Archaeological models relating style to kinship, in which patterns of descent and residence account for the transmission of style from one generation to the next, have taken hold in the examination of ceramic assemblages (Arnold 1989; Longacre 1981; Stanislawski 1977). Yet, only a few archaeologists analyze stone tools in terms of kinship relationships by focusing on learning groups (Close 1977, 1989) and coresidential units (Rick 1980:314-316). Even if kinship relationships are related to artifact variation, archaeologists are still left with the question of whether or not differences and similarities are transmitted and created consciously or unconsciously. Perhaps there is a conscious intentional action on the part of the hide-worker to produce a stone scraper that conforms with his father's stone scraper, which represents their social identities as members of a particular patrilineal clan. On the other hand, the hide-worker may unconsciously make specific and consistent choices based on options limited by his clan and lineage membership.

Gamo hide-workers learn stone tool production and use from their fathers. Since postmarital residence is virilocal, the knowledge of stone tool production is transmitted and remains within a particular village location. Gamo stone tool morphological and spatial variation should reflect the degree of communication between individuals. Individuals of the same moiety, clan, and lineage, who live and

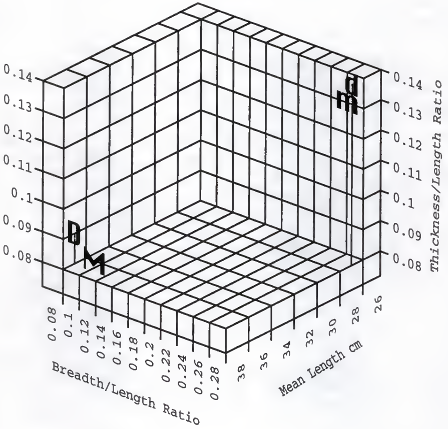
learn from one another, should share a mental template concerning handle and scraper morphology and distribution.

Moieties: Handles and Scrapers

In Gamo society, as discussed in Chapter 3, there is a division of clans into two exogamous groups, *mala* and *dogala* (i.e., moiety system). Although men marry women from an opposite moiety, men learn hide-working from their fathers. Even if they obtain resources through their wives, the final products resemble their father's work rather than that of their fathers-in-law. Hence, I expect that handles, sockets, and scrapers will reflect differences in moiety membership.

A three-dimensional graph comparing the moiety handles indicates a strong difference between handle types rather than moiety membership (Figure 6-1). However in a t-test, there is a significant difference between the mean values of breadth/length ratios of *dogala* and *mala tutuma* handles and between *dogala* and *mala zucano* handles (see Appendix Table C-19). There was only a statistical significant difference in the *dogala* and *mala zucano* sockets; the *tutuma* sockets were not significantly different from one another. Again, this may be attributable to the fact that the height of a *tutuma* haft is directly related to the size scraper placed within and is highly variable. The latter suggests that handle morphology is distinguishable based on moiety membership.

In addition to representation of moiety membership through handle morphology, scraper morphology is statistically significantly different between the



Legend
D *dogala tutuma* (n=112) **d** *dogala zucano* (n=48)
M *mala tutuma* (n=41) **m** *mala zucano* (n=28)

Figure 6-1: Graph illustrating the clustering of moiety handles by handle type rather than moiety membership.

two moieties in terms of length, width, and thickness (see Appendix Table C-20 and C-21). However, I was concerned that perhaps one moiety in my sample had more of one handle type than the other and that this would skew the scraper results (see Chapter 5 for scraper differences based on handle types).

Figure 6-2 demonstrates that there is a difference in the number and percentage of unused and used-up scrapers used in *zucano* and *tutuma* handles within each

moiety. There are more *dogala* moiety hide-workers with *tutuma*-hafted scrapers and more *mala* moiety hide-workers with *zucano*-hafted scraper. The latter may account for the scraper differences between the two moieties, as in Chapter 5 it has already been demonstrated that there are significant differences in the scraper morphologies of the two handle types.

The division of moieties by handle type is probably related to settlement patterns. Lineages rarely move and as such, there are territories occupied by particular clans, and because of clan clustering there are moiety clusters. In my scraper collection, 100 percent of the unused (n=260) and 98 percent (n=366) of the used-up *mala* moiety scrapers are from Borada and Ochollo, where hide-workers predominately use *zucano* handles. Though as discussed previously in Chapter 3, there are eleven hide-workers living in these *deres*, who use *tutuma* handles. In contrast, only 41 percent of the unused (n=279) and 56 percent of the used-up (n=379) *dogala* moiety scrapers are from Borada and Ochollo *deres*. These regional differences offer an explanation for the handle-scraper type ratio differences observed between the *dogala* and *mala* moieties.

Although, my scraper collection is unbalanced in terms of handle type, moiety, and *dere*, my survey information indicates that there are actually about the same percentage of *mala* and *dogala* hide-workers in each *dere* (Figure 6-3). This allows, as discussed in Chapter 3, individuals to marry within their *dere* to individuals of the opposite moiety. My collection was skewed because many of the *mala* clans living in the highland areas (Zada, Kogo, Dorze, and Doko) now predominately use glass, which I did not collect.

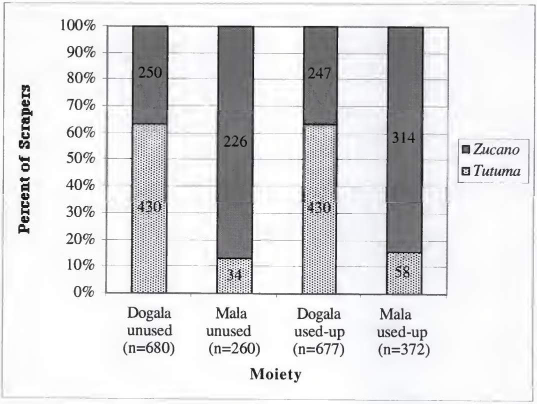


Figure 6-2: Comparison of moiety unused scrapers demonstrating the higher percentage of *tutuma* handles used by the *dogal*a and a higher percentage of *zucano* handles by the *mala* moiety

To determine if each moiety has a unique scraper form regardless of handle type, I compared unused and used scrapers divided in terms of moiety and handle types. This analysis also resulted in significant differences (see Appendix Table C-22 and Table C-23). In summary, *tutuma dogala* and *mala* scrapers were significantly different than one another, as were *zucano dogala* and *mala* scrapers concerning most of the dimensions compared (length, breadth, thickness, breadth/length, and thickness/length).

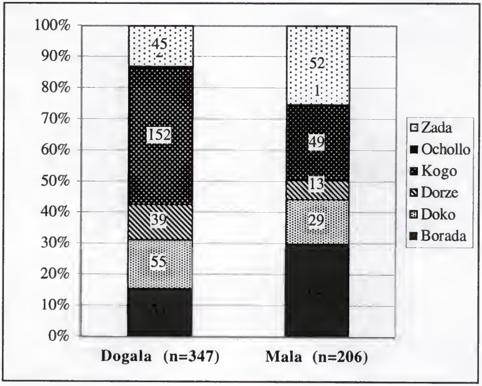


Figure 6-3: Graph illustrating a similar number of individuals in each *dere* who are members of the *dogala* and *mala* moieties.

Hence, the data confirm a shared knowledge of handle, haft, and scraper morphology within each moiety. The next section examines clan membership and handle type to determine if morphology of handle and scrapers are significantly different at this level of group identity.

Clans: Handles and Scrapers

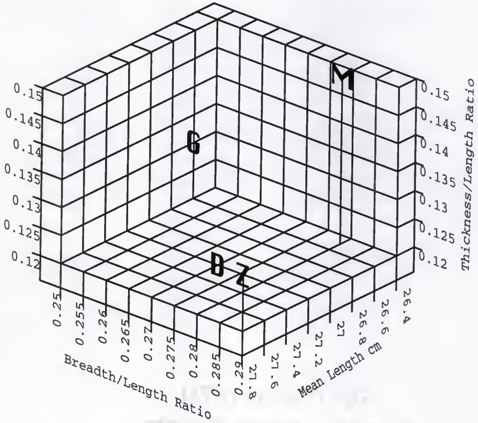
Clans were identified as important to the hide-workers. Individuals with the same clan name are considered "brothers" and when traveling, hide-workers will stay with *degala* families sharing their same clan name. When one considers moving to

another village, with rare exception, one can only move to a village where there are either no other hide-workers or hide-workers that have the same clan as ones' own.

The most common clans among the Gamo hide-workers in the *deres* in which I worked extensively (Borada, Kogo, Zada, Doko, Ochollo, and Dorze) are the Gezemala, Damota, Maagata, and Zutuma clans. Bola, Bolosa, Amara, and Goodaramala are also common clan names. A comparison of handle dimensions based on clan and divided by handle type indicates that there is a statistically significant difference in handle morphology between the different clans (Figures 6-4 and 6-5, see Appendix Table C-24 and Table C-25).

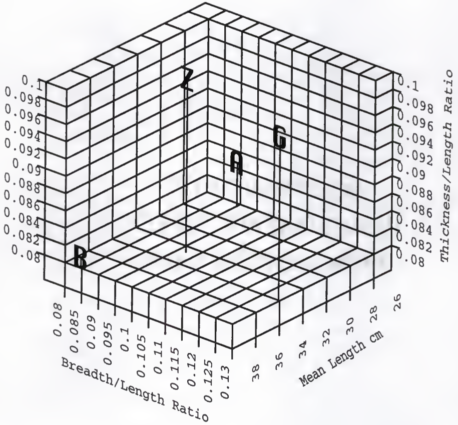
However, *tutuma* sockets belonging to different clans were not significantly different from one another, while *zucano* sockets were different (see Appendix Table C-26 and Table C-27). This may be because many *tutuma*-users tend to make their own handle rather than inherit it from their father. The *tutuma* assemblage from the clans of Amara (7 villages in 15 observations), Bola (12 villages in 19 observations), Gezemala (16 villages in 36 observations), and Zutuma (12 villages in 40 observations) are each represented by many villages with a fairly equal distribution between each clan. In contrast, most clans (4 out of 6 comparisons) using *zucano*s had sockets that were significantly different from one another. This is probably because many of the clans using the *zucano* handle are represented by a single village and lineage, who have passed down the handles from one generation to the next. For instance, my assemblage of *zucano* handles from the Damota (4 villages but with 1 representing 50 percent), Gezemala (7 villages but with 1 representing 53 percent), and Maagata (3 villages but with one representing 91 percent) clans were each

dominated by information from a single village. Thus, differences in handles and sockets between *zucano*-using clans may be pointing to differences in handles based on lineage/village membership. The differences may be explained in the number of villages/lineages represented by each clan and the inheritance practices concerning *zucano* (inherited) versus *tutuma* (not inherited) type handles.



Legend
D Damota (n=10) **Z** Zutuma (n=10) **G** Gezemala (n=17) **M** Maagata (n=19)

Figure 6-4: Graph demonstrating handles differences between *zucano* -using clans.



Legend
B Bola (n=19) **Z** Zutuma (n=40) **G** Gezemala (n=36) **A** Amara (n=15)

Figure 6-5: Graph demonstrating handle differences between *tutuma*-using clans.

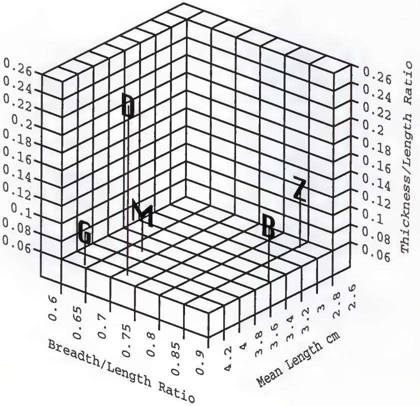
Figure 6-6 illustrates that a comparison of unused scraper morphology in terms of clan membership clusters into two groups: 1) Zutuma and Bolosa and 2) Maagata, Damota, and Gezemala. The used-up scrapers also cluster, but not as tightly, into two groups: 1) Maagata and Zutuma and 2) Gezemala, Damota, and Bolosa (Figure 6-7).

The clustering of the unused scrapers is probably the result of handle type (Figure 6-6). For instance, the unused scrapers from the Zutuma and Bolosa clans predominately come from *tutuma*-using villages, while the unused scrapers of the Maagata, Damota, and Gezemala clans are from *zucano*-using villages. The clustering of the used-up scrapers cannot be explained by handle type (Figure 6-7). The Bolosa and Gezemala clan scrapers are primarily from the *mota* of Shongalay, which may explain their similarity. However, I do not know why the Damota scrapers are similar to the Gezemala and Bolosa scrapers.

Although there is some clustering of clan scrapers in the graphic illustrations (Figures 6-6 and 6-7), the t-tests indicate unused and used-up scrapers are significantly different from one another based on clan membership (see Appendix Table C-28, Table C-29, Table C-30, and Table C-31). Clan differences were primarily expressed in breadth/length, thickness/length, and retouch length, but not concerning weight or distal edge angle. This suggests that there is continuity between overall scraper morphology and clan membership.

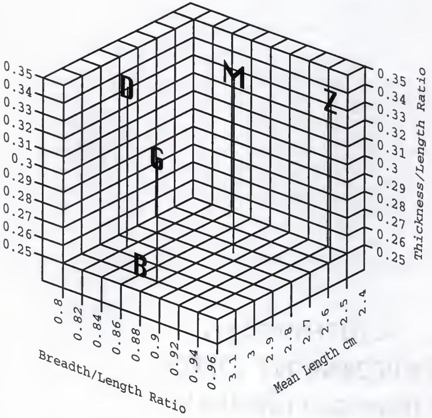
However, the village make-up of the clans may be as important in deciphering scraper morphology as handle and haft morphology (see Appendix Table B-7 and Table B-8). Each clan I studied primarily consists of one lineage/village with a single handle type (e.g., Maagata from Amure Dembe Chileshe *zucano*; Zutuma from Patela Tsela *tutuma*; Bolosa from Eeyahoo Shongalay *tutuma*). There are two exceptions as the Damota and Gezemala clans consist primarily of two different handle types. Similarity in handle type or distribution probably explains why Damota and Gezemala

(an equal mixture of two handle types) and Zutuma and Bolosa scrapers (both *tutumas*) are similar in some instances.



Legend
Mostly *zucano*-users = **G** Gezemala (n=249) **D** Damota (n=72) **M** Maagata (n=244)
Mostly *tutuma* users = **B** Bolosa (n=64) **Z** Zutuma (n=296)

Figure 6-6: Graph comparing clan unused scrapers illustrating two general clusters associated with handle type.



Legend
Mostly *zucano*-users = **G** Gezemala (n=352) **D** Damota (n=50) **M** Maagata (n=218)
Mostly *tutuma* users = **B** Bolosa (n=142) **Z** Zutuma (n=239)

Figure 6-7: Graph comparing clan used-up scrapers illustrating two general clusters NOT associated with handle type.

Unfortunately, it was not possible to collect scrapers from one clan using the same handle type in two different villages representing different lineages because it simply does not exist. At most, if this did occur it represented a sole individual who moved to the area (usually Borada). Therefore, this individual would not actually represent a different village or social group but rather the one he came from. It is possible that clan membership is reflecting lineage/village membership, so below, I compared different lineage/villages.

Lineages and Villages: Handles and Scrapers

The hide-workers socialize and work most closely with other hide-workers who live in their same village. Often villages are represented by a patrilineage, who have learned how to make handles and scrapers from one another. Thus, I would expect to see stronger similarities among village hide-workers' handles and scrapers, than between subregional, *dere*, moiety, and clan groups.

In each of the villages of Mogesa, Amure, Eeyahoo, and Patela, the hide-workers belong to a single patrilineage (see locations Chapter 2, Figure 2-2). Gamo hide-workers have a strong sense of family on the village level. Fathers and brothers often help inexperienced hide-workers shape their tools and give them tips on scraping the hides, as well. When a hide-worker is having problems getting a sharpened edge on a particular piece, he will turn to another local hide-worker to help him. There is no competition to scrape the best hide, to produce the best scraper, or to obtain the best raw material.

In each village, the hide-workers had a very difficult time selecting their own scraper out from others in their village during a sorting test. Ten of the thirty hide-workers offered to select their own scrapers out from others. The latter all believed that they could select their own scrapers because "their hands had made them," while the others were more skeptical. In a pile-sort collection sample size ranging from 20 to 24 scrapers for each village, only three of the hide-workers (Amaylo in Eeyahoo, Buta in Mogesa, and Yeka in Mogesa) selected one of two scrapers in the collection, which they had actually made. Six of the other hide-workers did not accurately choose their own scrapers, however they did select scrapers made by others in their

village. Only one hide-worker chose scrapers from another village, the very young hide-worker, Mola, who works very infrequently and has only made scrapers for five years. Most hide-workers declined to try to select out their own scrapers from others in their village and those that tried mostly were not able to identify their own but chose others from their own village. This suggests that although they were not able to articulate the precise attributes, the overall morphology of the scrapers is discernable in terms of village membership. This would seem to indicate that there would be strong similarities in hide-working material culture within a village.

The hide-workers in all four villages believed that they could identify their own village scrapers because of the raw material color. Each village prefers particular raw material colors, which are selected by the conchoidal nature of the locally available cherts. The hide-workers test the glass-like nature of the material by breathing on the stone. If the stone has a shine to the surface, it is considered a good working stone. Although the hide-workers in each of these villages use other colors of chert, they are considered inferior, and the color they prefer dominates their village assemblage (Figure 6-8). The village of Mogesa prefers green and black chert, Eeyahoo gray chert, Amure yellow-brown, red, and gray chert, and Patela yellow-brown, red, and green chert. A chi-square test determined that the differences in scraper colors are significant at the 0.05 level (see Appendix Table C-32). Obsidian is not a material that distinguishes village membership, as all four villages use it in equal amounts, about 6 to 10 percent of their assemblage.

The village of Mogesa accurately chose (100 percent) all the scrapers made within their village (green and black colors), which predominate the scraper

assemblage that I collected from them. However, they also chose obsidian and gray scrapers from Eeyahoo, black and brown scrapers from Amure, and black and gray scrapers from Patela. These colors are also common in Mogesa. Amure hide-workers were also very accurate in choosing scrapers made in their village (88 percent). A majority selected yellow-brown, brown and red scrapers, which does dominate their scraper assemblage that I collected. They also chose one green scraper from Amure, red, obsidian, brown, and gray scrapers from Eeyahoo, and a red Patela scraper. The color of green is not common in Amure and it is curious that they chose this scraper. Although the scraper was hafted in a *zucano*, like their own scrapers. However, the other colors of red, brown, and gray are common to the village source of chert. The *tutuma*-users of Patela and Eeyahoo were less accurate. Patela hide-workers chose obsidian, green, red, and yellow scrapers resulting in 63 percent accuracy in selecting scrapers made in their own village. They also selected green and black scrapers from Mogesa, a red scraper from Eeyahoo, and red and yellow scrapers from Amure. The Patela scrapers, which I collected, represented the most diverse range of colors of all the village scrapers, which may have made it difficult for them to differentiate their own scrapers based on color. Eeyahoo had the poorest results, 14 percent, selecting a brown/white scraper as their own, as well as a brown scraper from Amure. It is curious that I mostly collected green, white, and yellow scrapers from Eeyahoo, but that the hide-worker did not choose these colors. As previously discussed in Chapter 2, the hide-workers in this village are young and moved to the area. It is possible that the presence of older hide-workers, who have more experience working with the materials, were more sensitive to the color ranges present in their village source than

the Eeyahoo villagers who moved there and probably used different sources before they moved to Eeyahoo.

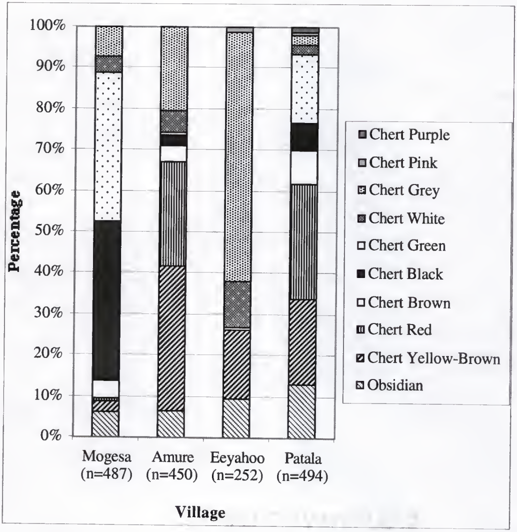
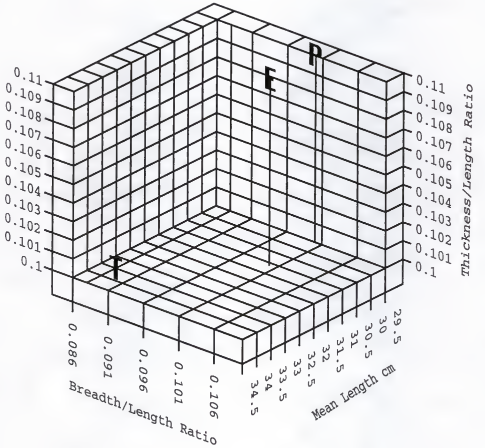


Figure 6-8: Graph illustrating the different colors of raw materials used by each lineage/village.

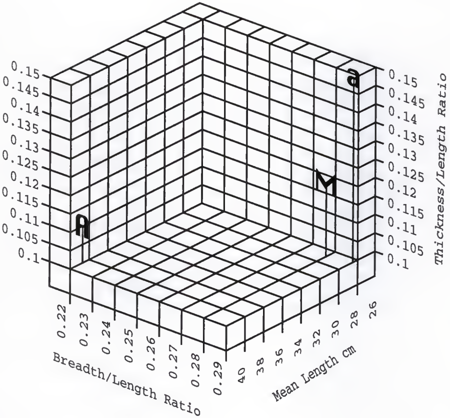
Three-dimensional graphs of village handle types demonstrate the geographical relationship between *zucano*-using villages and between *tutuma*-using villages (Figures 6-9 and 6-10). Statistical comparison in a t-test indicates that each

village is significantly different in terms of handle morphology (see Appendix Table C-33).



Legend
E Eeyahoo (n=5) **T** Tzabo (n=5) **P** Patela (n=18)

Figure 6-9: Graph demonstrating the differences between handles of *tutuma*-using lineage/villages.



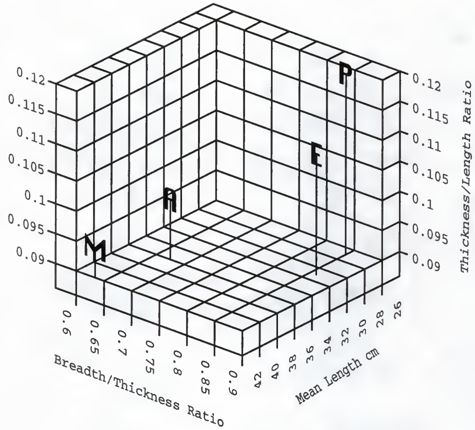
Legend
M Mogesa (n=12) **A** Afilaketsa (n=5) **a** Amure (n=17)

Figure 6-10: Graph demonstrating the handle differences between *zucano*-using lineages/villages.

However the socket breadth/height ratios are not significantly different between the *tutuma*-using villages and most *zucano-using* villages (see Appendix Table C-34). Since each individual only owns one or two handles in *tutuma*-using villages, and in *zucano*-using villages, handles are often shared, each village had a small number of handles. In both cases, many of the sample sizes are too small to render valid statistical results.

A graphic illustration of the unused and used-up scrapers of Patela, Eeyahoo, Mogesa, and Amure suggests that they are significantly different from one another (Figure 6-11 and 6-12). T-tests confirm that the village unused scrapers are significantly different, with the exception of breadth/length ratio between Patela and Eeyahoo (see Appendix Table C-35 and Table C-36). Both of these villages use *tutuma* handles, which may account for the similarity in breadth/length ratios.

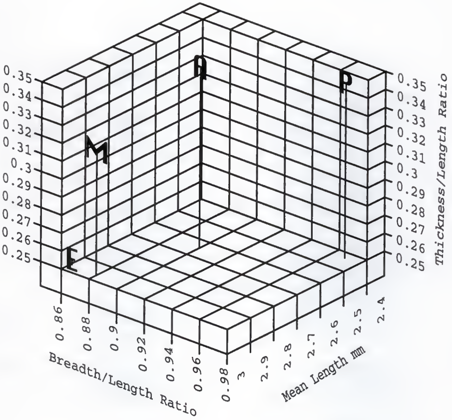
The used-up scrapers are also significantly different based on village membership except for the breadth between Patela and Amure, length between Eeyahoo and Mogesa, and the proximal thickness between Eeyahoo and Amure (see Appendix Table C-37 and Table C-38). Distal thickness, thickness/length ratio, breadth/length ratio, and retouch length were predominately statistically different when comparing the used-up scrapers based on village membership. Both Eeyahoo and Mogesa are located in Shongalay *mota.* However, the hide-workers in these two villages are not related to one another. Eeyahoo consists of two brothers and another hide-worker who recently moved into the area and are completely unrelated to the Mogesa hide-workers. When I was collecting scrapers from these two villages, the rains had not come although it was the rainy season (July through September). This meant that chert resources were more scarce than usual, which might have led to increased curation and reduction of the tools to a similar size. The difference between the mean length of unused and used-up Eeyahoo scrapers is only 0.12 cm which is not much reduction, while the difference between the mean length of the unused and used-up Mogesa scrapers is 1.27 cm. However, it might still indicate stone conservation.



Legend
P Patela (n=285) **M** Mogesa (n=209) **E** Eeyahoo (n=78) **A** Amure (n=239)

Figure 6-11: Graph demonstrating the differences between unused scrapers between lineages/villages.

When other attributes are compared between villages, we see both village individuality and pan-Gamo similarities. Raw materials that have a patina from long-term exposure to air or have cortex are not considered good. In all four villages, there was very little cortex remaining on any of the tools, seventy-two to eighty-three percent of the scrapers had no cortex and the remaining nine percent had less than twenty-five percent cortex coverage (see Appendix Figure D-14).



Legend
P Patela (n=209) **M** Mogesa (n=283) **E** Eeyahoo (n=174) **A** Amure (n=211)

Figure 6-12: Graph demonstrating the differences between used-up scrapers between lineages/villages.

A comparison of planform (see Appendix Figure D-15 and Figure D-16), dorsal scar pattern (see Appendix Figure D-17), cross-section (see Appendix Figure D-18 and D-19), platform locations (see Appendix Figure D-20), and location of used edges (see Appendix Figure D-21) demonstrate differences emphasizing hafting in either *tutuma* or *zucano* handles rather than lineage/village membership. As discussed earlier, the *zucano* villages use only the distal edge for scraping which differentiates

them from the *tutuma* villages. Most of *tutuma*-using hide-workers use the distal edge and then the right edge for scraping. In Mogesa and Amure, the *zucano*-using villages, the typical unused scraper has radial dorsal scar pattern (70-80 percent) with ventral proximal end platform location (20 percent, with 75 percent unidentifiable). The unused and used-up scrapers are shaped mostly on either the distal edge (10 percent) or on the distal and one or both of the laterals (50 percent) forming either a short quadrilateral (40 percent unused and 80 percent used-up) or long oval planforms (40-80 percent unused). At Patela and Eeyahoo, where the *tutuma* handle is used, the typical unused scraper has a parallel one-direction, irregular or opposed dorsal scar pattern with ventral proximal end platform location (20 percent, with 75 percent unidentifiable). The unused scrapers are primarily short quadrilateral in planform (80 percent) and they tend to maintain this shape through use. Although there are similarities between villages based on handle type and concerning some characteristics such as planform, dorsal scar pattern, cross-section, and retouch location, each lineage/village expresses significant differences in their scraper morphology (both unused and used-up), when graphically plotted and statistically compared against scrapers from other villages.

Discussion

Gamo hide-workers do not consciously produce scrapers that are different from other moieties, clans, and lineages/villages. However, because they learn scraper procurement, production, and use from their fathers, there is an unconscious similarity in scraper form associated with patrilineal social groups.

Archaeological studies have considered chert color, luster, and inclusions as evidence for source locations and forager mobility strategies (Butler and May 1984; Luedtke 1976), but they rarely consider that color variety may be linked to social group choice and preference (Sackett 1985:280). The Gamo are able to select their own village scrapers based on raw material color. They are protective of their local resource, which they inherit through their patrilineal descent system. Village preference for particular colors of chert based on their conchoidal fracturing does lead to lineage/village distinction of scrapers based on chert color. Gould's (1968) study of the Ngatatjara of western Australia also indicated that toolmakers place a high value on quarries, which they associate with their "dreamtime totem" representing their "patrilineal relationship to the site."

Furthermore, my analyses indicate that in terms of kinship relationships, scrapers are morphologically distinct on the village level where they represent a single lineage group. Specifically, village residence is represented in terms of breadth, length, thickness, and sometimes planform, cross-section, and dorsal scar patterns of stone scrapers. In short, it is an understanding of the general morphology of the scraper between villages, which gives meaning to variation in social terms. My study rearticulates Sackett's (1985, 1989) theory of isochrestic style, advocating that it is a sum of the different components of the overall morphology of an object rather than individual attributes that identify style. Rick (1980:314-316, 1996) also used a combination of stone tool metric ratios (length, breadth, width), cross-section, and edge treatment to correlate projectile point variation with coresidential units or bands. Close's (1977) concept of style is similar, as she emphasizes a microtradition learned

unconsciously in a social context transmitted from one generation to the next. However, she recognizes style through eliminating functional and technological vectors, and considers the nonfunctional attributes of style to include retouch variants, the types of retouch for backing, and the location of the working edge and platform location. My research found no consistency in platform location and in relationship to the working edge, but did find retouch length to be an expression of social group differences in terms of moieties, clans, and lineages.

Analyses of lithic materials has the potential for revealing kinship relationships such as moiety, clan, and lineage when contrasted between village locations that belong to the same cultural group. Style is expressed unconsciously in terms of the overall morphology of the stone scrapers and does reflect patrilineal descent and residence.

CHAPTER 7
DOMESTIC GROUPS AND INDIVIDUALS

History and ethnography repeatedly tell us that the concept of identity is flexible, changing with and melding to the specific contextual situation of individuals (Jones and Graves-Brown 1996:5-7). Exploring similarities and differences in artifact style within tightly understood contexts, such as intrasite and household patterns may be our best avenue for understanding local identities. Few archaeologists have examined stone tools in terms of individual differences or the amount of knapping experience (Bonnichsen 1977; Gunn 1975; Toth 1985). These studies focus on flake scar orientation and type, to distinguish the scrapers belonging to different individuals and handedness. The Gamo intravillage identities are expressed in their stone tool morphology and spatial patterning in terms of domestic groups, age, and individualism, although handedness traits were not identifiable.

Domestic Groups

Household Spatial Arrangements

The location of hide-worker households within the village delineates their social position and learning groups because the craft is usually learned from fathers. As previously stated, artisan households are usually located on steep slopes and in areas of poor soils and irrigation. In addition, in the past, the artisans buried their

deceased within their household garden and the farmers had a separate burial ground. Today the artisans also have a burial ground but it is separate from the farmers, because of their association with pollution and infertility. Artisans are still refused burial in church cemeteries.

Since postmarital residence is virilocal, sons live near their father creating patrilineally related domestic groups. However, they live in a separate structure from their father's, although it is within the same compound and within 2-3 meters. Hence, households cluster in terms of learning groups. Storage, use, and discard patterns are directly associated with residence patterns, but also vary in terms of handle type, as discussed in Chapter 5. In the *zucano*-using villages of Mogesa and Amure, each hide-worker stores his unused scrapers in a wooden bowl or in a cloth sack within his household. The handles also are kept within the household. Hides are scraped inside the household and so resharpening flakes fall directly on the household floor and are left there (though a small attempt is made to sweep them to the edges of the house). Each of the household clusters (consisting of a father and his son) has a single discard location specifically for the used-up scrapers. The discard piles are usually located in thorn bushes near footpaths. In addition, used-up scrapers may be found near the hearth, scraping frame, and household threshold or on footpaths near the individual's house.

In Mogesa, there are three learning groups and three clusters of households: 1) Buta, Tesfy, and Goa; 2) Mokano, Mola, Yonja; and 3) Yeka (Figure 7-1). Yonja learned scraping from Mokano (his uncle) rather than from his father but lives closer

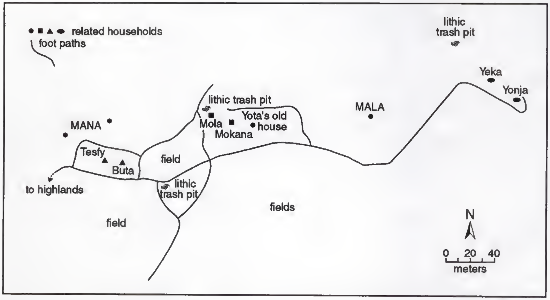


Figure 7-1: Map of Mogesa village illustrating the clustering of households by father-sons.

to Yeka. Therefore, Yeka and Yonja share a discard location. In Amure, there also are three learning groups and household clusters: 1) Hanicha, Osha, and Bedala; 2) Chamo of and Hagay; and 3) Gamana, Galche, and Mardos (Figure 7-2). However in terms discard there is a slightly different arrangement as Hanicha, Osha, Bedala, Chamo, and Hagay share one discard pile and Galche and Mardos share a discard location, but Gamana has his own discard location.

In *tutuma*-using villages, there is a different pattern of household storage, use, and discard location. In the villages of Patela and Eeyahoo, each hide-worker stores his blocks of raw chert materials in his enset garden near his household. The unused scrapers and debitage are kept in a ceramic bowl also kept in the enset garden. The handles are often wedged in the stalks of the enset plants. Hides are scraped outside the household and so resharpening flakes fall directly on the ground and are left there with no attempt to move them. Used-up scrapers may be found near the scraping frame or footpaths, but are not found in the households near the hearth. There are four learning groups and household clusters in Patela: 1) Gaga, Darsa, and Garbo; 2) Tina and Tinko; 3) Tsoma and Uma; and 4) Unkay, Arka, Abata, and Basa (Figure 7-3). Although Darsa is a brother to Garbo and Gaga, he lives separately from them. Patela's used-up scrapers and debitage are scattered into the enset garden near the household.

In Eeyahoo, each hide-worker has his own household and discard location. They each live equidistant from one another (Figure 7-4). Since they moved into the village, there is no residence pattern based on kin relationships. The Eeyahoo

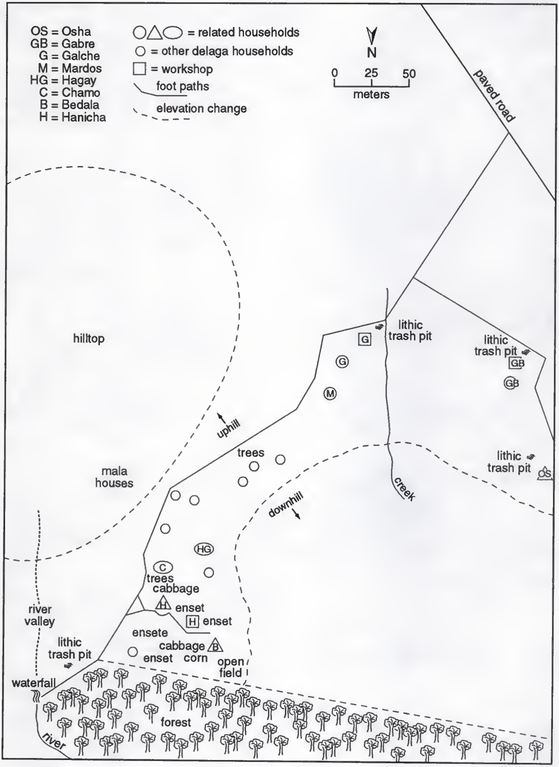


Figure 7-2: Map of Amure village illustrating the clustering of households by learning groups.

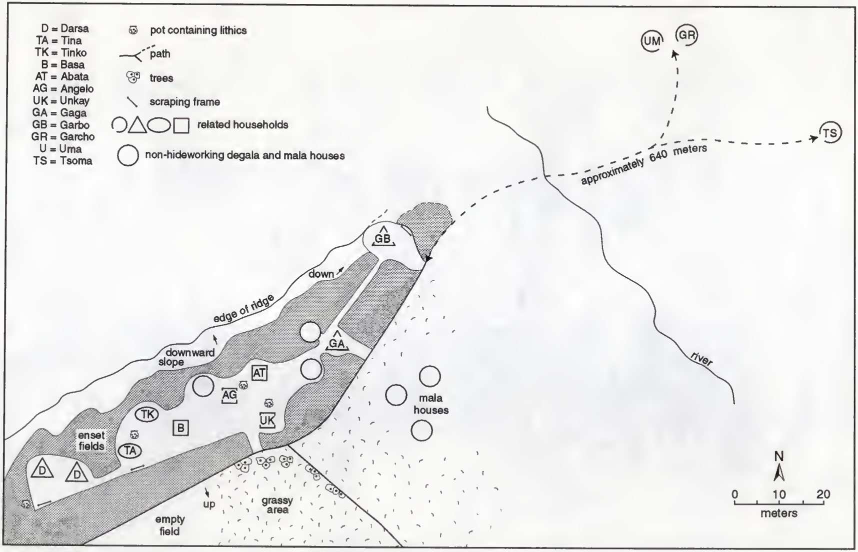


Figure 7-3:Map of Patela village illustrating the clustering of households by learning groups.

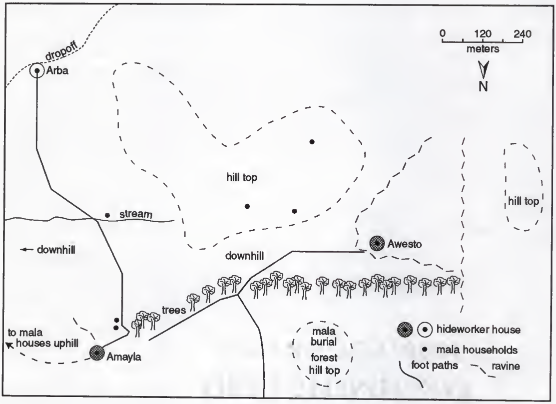


Figure 7-4: Map of Eeyahoo village illustrating the absence of household clustering.

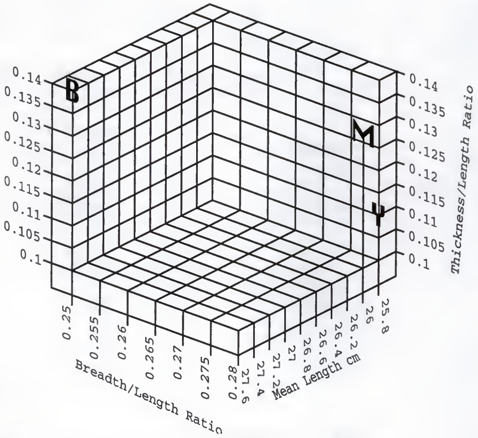
Shongalay hide-workers are estranged from their fathers, who live in another village and *dere*. They all use a *tutuma* like their fathers, rather than the *zucano* handle used by the Mogesa Shongalay hide-workers. Yet, two of the hide-workers (not the two brothers) have picked up other cultural traits belonging to *zucano*-using hide-workers. For instance, two of the Eeyahoo hide-workers scrape hides inside their household, rather than outside. In addition, they have specific discard piles, rather than throwing their scrapers into their garden. This suggests that there may be local social pressures to conform to local hide- working methods when hide-workers move into a new area.

Since the households in each village tend to cluster because of virilocal residence rules, the scrapers that belong to father-son learning groups also cluster within the village setting. Furthermore fathers and sons share discard piles, which means that discarded used-up scrapers are also spatially distinct based on domestic group membership.

Handles and Sockets

In villages that use the *zucano* handle, the handles are inherited from elder hide-workers and if the elder is still living, he shares his handles with his sons. In contrast, the individuals in *tutuma*-using villages make their own handles. The number of handles and sockets from each village is too low, however, to determine if there are statistically significant differences.

Mogesa, a *zucano*-using village, is the only village in which hide-workers shared handles (Figures 7-5 and 7-6). At Mogesa, there are three sets of handles shared by the three elders (see Appendix Figures A-1 and A-2 for kinship



Legend
B Buta (3) **M** Mokano (3) **Y** Yeka (3)

Figure 7-5: Graph illustrating the differences between the handles of the three Mogesa domestic groups.

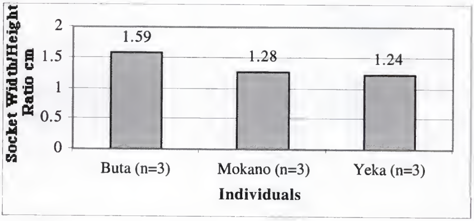
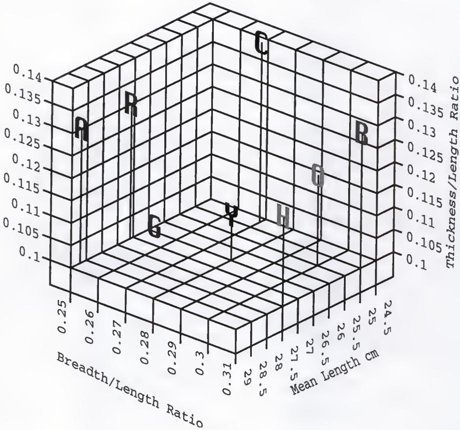


Figure 7-6: Graph illustrating the differences between the sockets of the three Mogesa domestic groups.

relationships) with their sons and nephews. Although Buta's handles and sockets are different morphologically from those of Mokano and Yeka, the latter's handles and sockets are very similar to each other in breadth/length/thickness (Figures 7-5 and 7-6).

At Amure, also a *zucano*-using village, the comparison of the handle morphology (Figure 7-7) demonstrates a clustering into three domestic groups: 1) Gabre, Gamana, and Galche; 2) Hagay and Chamo; and 3) Hanicha, Osha, and Bedala.



Legend
Domestic group 1: G Galche (n=2) **A** Gamana (n=2) **R** Gabre (n=1)
Domestic group 2: C Chamo (n=2) Y Hagay (n=1)
Domestic group 3: H Hanicha (n=4) O Osha (n=2) B Bedala (n=2)

Figure 7-7: Graph illustrating the differences between handles of the three Amure domestic groups.

These three clusters represent descent from three different grandfathers (see Appendix Figure A-3, A-4, and A-5 for kinship relationships). Hanicha gave two of his handles to Osha his son and Gabre gave his handles to his son, Gamana. All the other hide-workers received their handles from their fathers, who are now deceased. The Amure socket sizes (Figure 7-8) also cluster in terms of domestic groups, except for Galche and Bedala, which are similar to one another but not their domestic cluster.

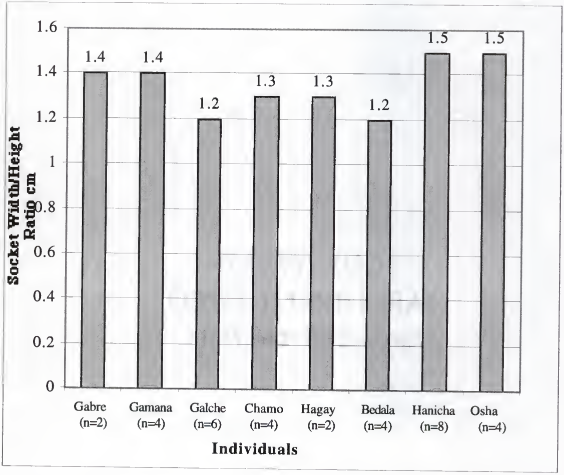
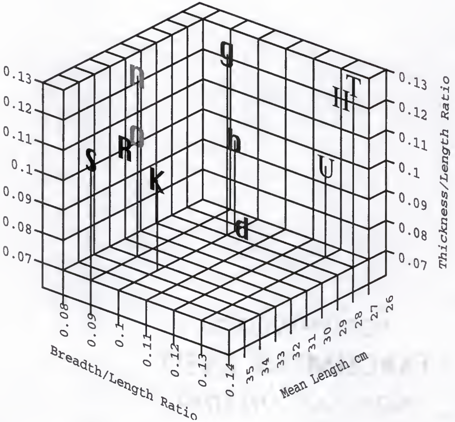


Figure 7-8: Graph illustrating the clustering of socket sizes by domestic group in Amure (Group 1: 1.4, Group 2: 1.3, and Group 3: 1.5).

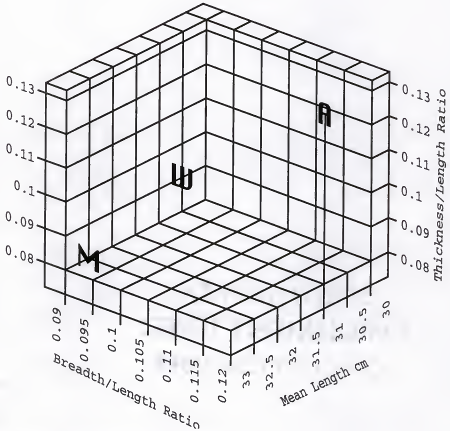
At the *tutuma*-using village of Patela, a comparison of the individual handles indicates four clusters which can be associated with domestic groupings: 1) Darsa, Garbo, and Gaga; 2) Tinko and Tina; 3) Arka, Abata, Unkay, and Basa; and 4) Garcho, Uma, and Tsoma (Figure 7-9, see Appendix Figures A-6, A-7, A-8, and A-9).



Legend
Domestic group 1: **g** Gaga (n=2) **d** Darsa (n=1) **b** Garbo (n=2)
Domestic group 2: H Garcho (n=1) T Tsoma (n=1) U Uma (n=1)
Domestic group 3: n Tina (n=2) o Tinko (n=2)
Domestic group 4: K Unkay (n=2) **A** Arka (n=2) **S** Basa (n=1)

Figure 7-9: Graph illustrating the clustering of handles by domestic group in Patela.

(Figures 7-11 and 7-12) (see Appendix Figures A-10 and A-11 for kinship relationships).



Legend
M Amaylo (n=1) **W** Awesto (n=2) **A** Arba (n=2)

Figure 7-11: Graph illustrating that handle morphologies are not similar among individuals living in Eeyahoo.

Handles, especially *zucano* handles, are generally passed down from one generation to the next, and therefore individual handles cluster in terms of patrilineal descent lines. The sockets on individual's handles also tend to reflect descent groups and learning groups for *zucano* hafts. However, the flexible nature of *tutuma* hafts allows for more variation, perhaps on the individual level of particular scraper choice.

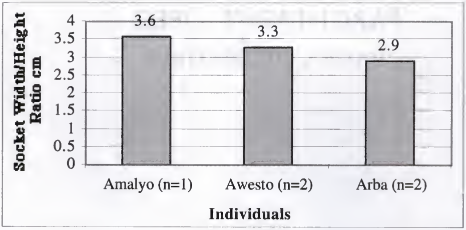


Figure 7-12: Graph illustrating that socket size does not cluster in Eeyahoo.

Unused Scrapers

Since sons use their father's handles and learn to make scrapers from them, it is reasonable to expect that unused scrapers will reflect this social association. A comparison of the mean value for length, breadth/length ratio, and thickness/length ratio of unused scrapers for each individual in all four villages indicates clustering in terms of domestic-learning groups (Figures 7-13, 7-14, 7-15, and 7-16).

The unused scrapers produced by the Mogesa hide-workers cluster into three domestic groups (Figure 7-13). Mokano, Yonja, and Mola's unused-scrapers cluster together, while the unused scrapers of Yeka, Buta, and Goa also cluster together. Tesfy's unused scrapers do not cluster with any of the others.

In Amure, there is also clustering based on domestic groups in terms of unused scrapers (Figure 7-14). For the unused scrapers, there is one cluster by Hanicha, Osha, and Bedala and a second cluster of Gamana, Gabre, and Galche. Hagay and Chamo

Most of the Patela hide-workers made their own handles from local resources rather than inheriting them. Although the handles cluster by domestic group membership, the *tutuma* sockets of Patela do not reflect domestic groups (Figure 7-10). Instead, they represent individuality.

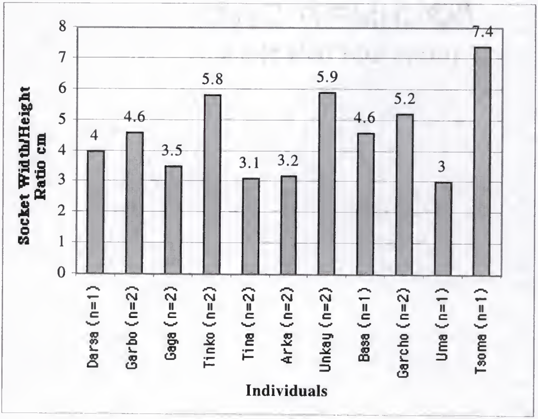


Figure 7-10: Graph illustrating that sockets size does not cluster by domestic group in Patela.

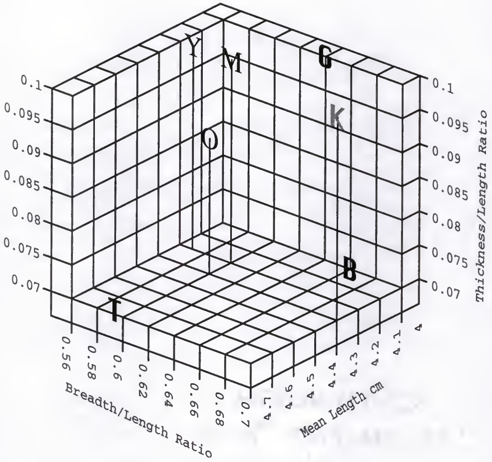
At Eeyahoo, there is no clustering of handle morphology or sockets among the resident hide-workers. Eeyahoo is a *tutuma*-using village, and the hide-workers each made their own handle and do not live near their fathers. Consequently, the Eeyahoo handles express no clustering of handles and sockets, not even between brothers

though do not cluster together, but since Hagay is almost blind, his scraper results may not accurately represent his domestic group membership.

In Patela, the unused scrapers also reflect the four domestic groups with the exception of Arka and Unkay's scrapers (Figure 7-15). Unkay's and Arka's scrapers were almost all obsidian compared to others in their lineage, which may account for their longer length. Obsidian scrapers made by the Gamo tend be longer in their unused form compared to chert scrapers, but are reduced more during use and so used-up obsidian and chert scrapers have a similar length (see Chapter 4).

At Eeyahoo, the unused scrapers of the two brothers Amaylo and Awesto cluster together, separate from Arba's (Figure 7-16). However, the brother's scrapers do not seem to be similar to their father's. It should be noted, however, that he no longer scrapes hides and lives in another village. However, he did produce unused scrapers for me on request, though his strength was clearly waning and he was not able to make the 30 that I requested. The brothers are estranged from their father and have no incentive to maintain a similarity in scraper form.

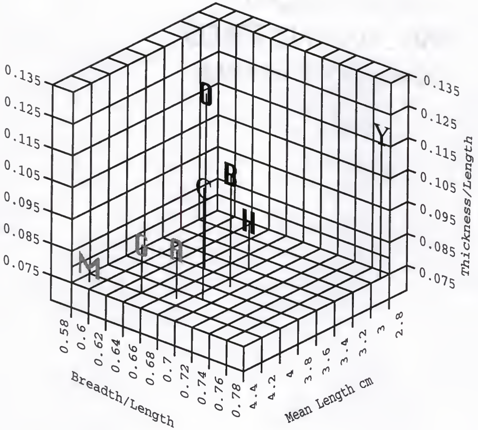
The mean values of individual unused scrapers, within each village, express clustering in terms of domestic groups (see Appendix A for kinship relations), when plotted on a three-dimensional graph (Figures 7-13, 7-14, 7-15, and 7-16). T-tests confirm that there are significant differences between the domestic-learning groups, discussed above, in Mogesa (see Appendix Table C-39 and Table C-40), Amure (see Appendix Table C-41 and Table C-42), and Patela (see Appendix Table C-43 and Table C-44). T-tests were not used to compare Eeyahoo learning groups, since they do not exist in this particular village.



Legend

Domestic group 1: T Tesfy (n=30) **B** Buta (n=32) **G** Goa (n=28)
Domestic group 2: M Mokano (n=30) O Mola (n=30) Y Yonja (n=28)
Domestic group 3: K Yeka (n=31)

Figure 7-13: Graph illustrating the clustering of Mogesa unused scrapers by domestic group.



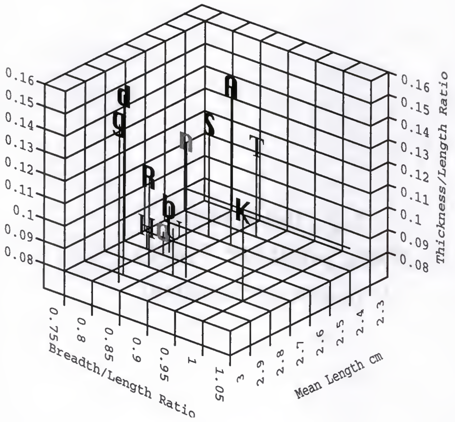
Legend

Domestic group 1: H Hanicha (n=30) **O** Osha (n=30) **B** Bedala (n=39)

Domestic group 3: C Chamo (n=29) Y Hagay (n=30)

Domestic group 2: G Galche (n=21) A Gamana (n=29) M Mardos (n=31)

Figure 7-14: Graph illustrating the clustering of Amure unused scrapers by domestic group.



Legend

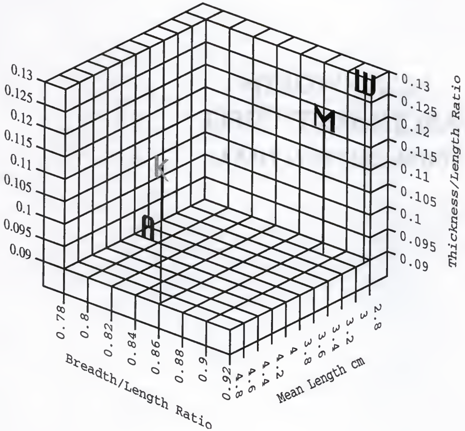
Domestic group: g Gaga (n=22) d Darsa (n=26) b Garbo (n=21)

Domestic group: H Garcho (n=30) T Tsoma (n=22) U Uma (n=27)

Domestic group: **n** Tina (n=22) **o** Tinko (n=19)

Domestic group: K Unkay (n=24) **R** Arka (n=25) **S** Basa (n=24) **A** Abata (n=23)

Figure 7-15: Graph illustrating the clustering of Patela unused scrapers by domestic group.



Legend
A Arba (n=23) **M** Amaylo (n=27) **W** Awesto (n=28) K Anko (n=19)

Figure 7-16: Graph illustrating clustering of brother's unused scrapers in Eeyahoo.

Distal edge angles of unused scrapers also cluster in learning groups (Figures 7-17, 7-18, 7-19, and 7-20). This is to be expected as fathers or uncles teach their sons to produce a certain working edge to scrape the hides, a working edge they themselves have been successful with. The hide-worker learns through instruction and experience as to which working edge is too sharp or is too dull. But the final morphology of an edge and how long it is used before it breaks or is dull may have to do more with the

experience and age of the hide-worker (see age below), the type of raw material used (chert verse obsidian), and the amount of use a particular edge is exposed to may be related to the type and thickness of the hide (see Chapter 4).

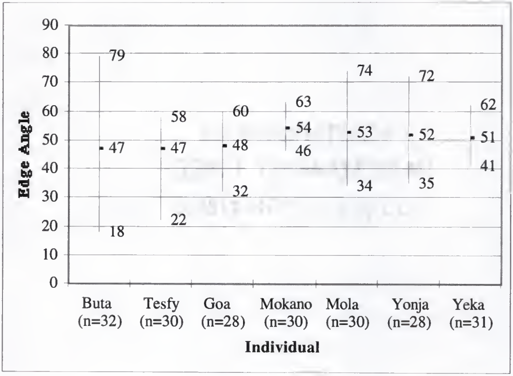


Figure 7-17: Graph illustrating individual Mogesa unused distal edge angles and clustering mean by domestic group (Group 1: 47-48 and Group 2: 51-54).

In Mogesa, there are two clusters of edge angles: 1) a mean range edge angle of 47-48 degrees for Buta, Goa, and Tesfy, and 2) a mean range edge angle of 51-54 degrees for Mokano, Mola, Yonja, and Yeka (Figure 7-17). In Amure, the unused scraper mean distal edge angles (Figure 7-18) also reflects intravillage kinship relations: 1) Hanicha, Osha and Bedala at 52-53 degrees; 2) Hagay and Chamo at 55 degrees; while 3) Galche, Gamana, and Mardos range from 54 to 56 degrees. The

mean distal unused edge angles for Patela seem to cluster by domestic group as well: 1) Garcho, Uma, and Tsoma at 45-47 degrees; 2) Tinko and Tina at 48 degrees; 3) Arka, Abata, Unkay, and Basa at 47 to 50; and 4) Gaga, Darsa, and Garbo from 50-53 degrees (Figure 7-19). Finally, in Eeyahoo the unused distal edge angles express no clustering (Figure 7-20). However, the differences between unused distal edge angles of learning groups is not significant in t-test, because there is great variability in each assemblage (see Appendix Tables C-40, C-42, and C-44).

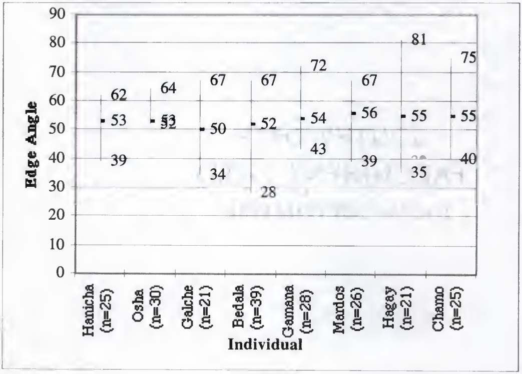


Figure 7-18: Graph comparing Amure unused distal edge angles (Group 1: 52-53, Group 2: 55, and Group 3: 54-56).

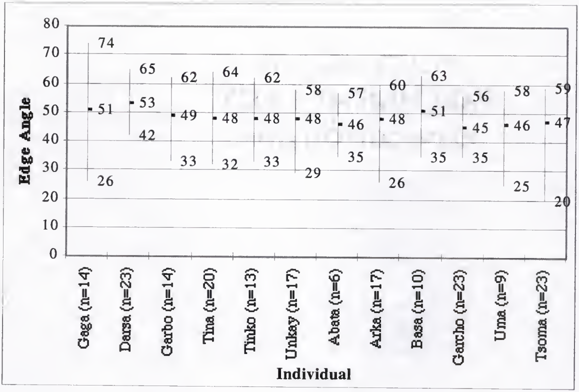


Figure 7-19: Graph comparing Patela unused distal edge angles (Group 1: 45-47, Group 2: 48, Group 3: 47-50; and Group 4: 50-53).

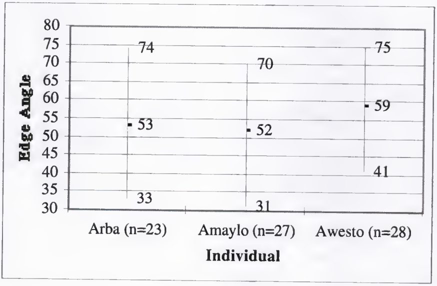


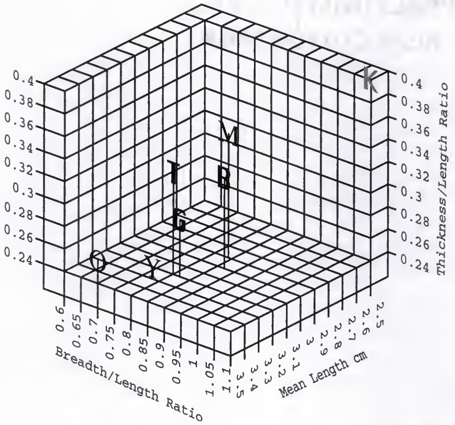
Figure 7-20: Graph comparing Eeyahoo unused distal edge angles.

The unused scrapers of individuals in each of the four villages tend to cluster in terms of domestic-learning groups both in overall morphology and in distal edge angle. Learning groups in each of the four villages include fathers, sons, and brothers who live in households located closely together. Unused scrapers are either stored within the household or directly outside the household of the owner. Since households cluster in domestic groupings, the spatial location of learning-group (father-son) unused scrapers also cluster.

Used-up Scrapers

The learning groups and individuality become harder to discern, when comparing the attributes of used-up scrapers. The used-up scrapers in the *zucano*-using villages of Mogesa and Amure tend to cluster in terms of domestic groups, as did the *tutuma*-using Eeyahoo hide-workers. In contrast, the *tutuma*-hafted scrapers in the village of Patela express more of a random pattern.

In Mogesa, the used-up scrapers (Figure 7-21) cluster in terms of the three learning groups: 1) Tesfy, Goa, and Buta; 2) Yonja and Mola, and 3) Yeka. Mokano, however, does not cluster with his son or nephew, whom he taught but rather with Buta. Concerning the used-up scrapers (Figure 7-22) there are also two clusters expressed in the Amure assembly: 1) Hagay and Chamo, and 2) Hanicha, Osha, Bedala. Although again there is an anomaly, as Gamana, Mardos, and Galche do not cluster with one another. The Eeyahoo used-up scrapers cluster in terms of learning groups, as the two brothers' scrapers are similar in morphology (Figure 7-33).

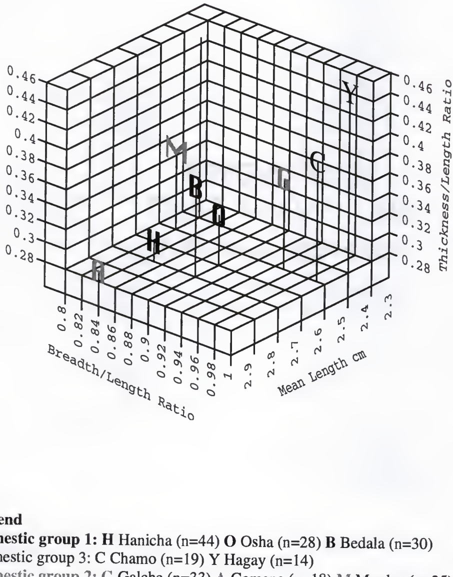


Legend
Domestic group 1: T Tesfy (n=50) **B** Buta (n=70) **G** Goa (n=26)
Domestic group 2: M Mokano (n=22) O Mola (n=21) Y Yonja (n=21)
Domestic group 3: K Yeka (n=68)

Figure 7-21: Graph illustrating the clustering of Mogesa used-up scrapers by domestic group.

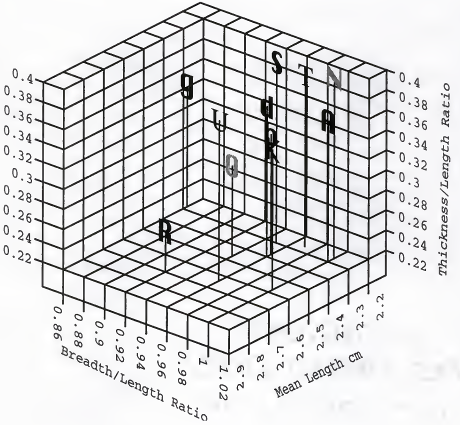
In contrast, the used-up Patela scrapers exhibit a random pattern with no clustering of learning units (Figure 7-23). There may be more diversity in the Patela assemblage due to individual decisions concerning whether to use lateral edges for scraping. The use of the lateral edge would reduce the scraper width and change its

morphology. Yet, the Eeyahoo *tutuma*-using hide-workers' used-up scrapers do indicate clustering between the brothers (Figure 7-24). The differences between the Eeyahoo and Patela assemblages may be the result of the Patela hide-workers (69 percent) more frequently turn the scrapers and use their laterals for subsequent scraping, than do the Eeyahoo (36 percent) hide-workers (Figure 7-25).



Legend
Domestic group 1: H Hanicha (n=44) **O** Osha (n=28) **B** Bedala (n=30)
Domestic group 3: C Chamo (n=19) Y Hagay (n=14)
Domestic group 2: G Galche (n=33) A Gamana (n=18) M Mardos (n=25)

Figure 7-22: Graph illustrating the clustering of Amure used-up scrapers by domestic group.

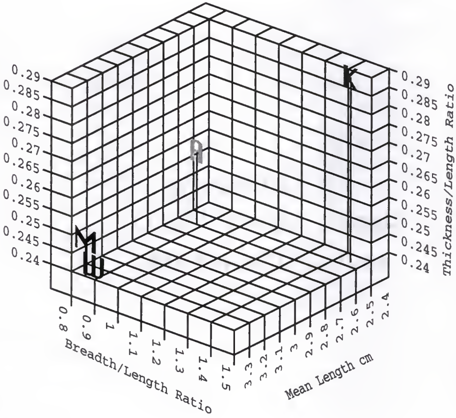


Legend
Domestic group: g Gaga (n=13) d Darsa (n=24) b Garbo (n=24)
Domestic group: T Tsoma (n=14) U Uma (n=12) (there are no Garcho used-up scrapers)
Domestic group: N Tina (n=25) 0 Tinko (n=17)
Domestic group: K Unkay (n=28) **R** Arka (n=25) **S** Basa (n=7) **A** Abata (n=16)

Figure 7-23: Graph illustrating that Patela used-up scrapers do not cluster by domestic group.

T-tests comparing the used-up scrapers of learning groups in each village indicate that they are significantly different from one another in Mogesa (see Appendix Tables C-45 and C-46), Amure (see Appendix Table C-47 and Table C-48),

and Patela (see Appendix Table C-49 and Table C-50). However, retouch length and distal edge angle are not significantly different when compared between the each of the domestic-learning groups.



Legend
A Arba n=(50) **M** Amaylo (n=57) **W** Awesto (n=67) **K** Anko (n=11)

Figure 7-24: Graph illustrating that Eeyahoo used-up scrapers do not cluster by domestic group.

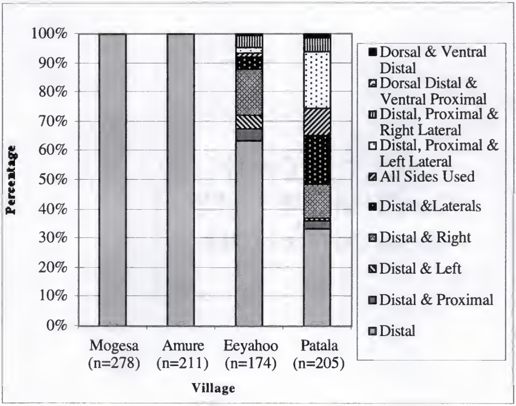


Figure 7-25: Graph illustrating that more edges of a scraper are used in Patela for scraping than in other villages, including Eeyahoo.

Domestic groups are expressed in stone tool morphology. Fathers teach their sons how to produce and use scrapers, and therefore, there are morphological similarities between their scrapers. Households that learn together also share residence and so scrapers that are similar morphologically in a village also spatially cluster within the village.

Individualism and Ideal Types

Individuals

Since sons learn hide scraping from their fathers, fathers and older brothers often help younger individuals shape and resharpen scrapers, and because they were unable to select their own scrapers in a pile sorting test, it was expected that there would be very little individual variation. Furthermore, in *zucano*-using villages where handles are shared between learning group members, I would expect even less variation than between individuals in *tutuma*-using villages, who make and use their own handles.

However, t-tests comparing the morphological measurements of unused scrapers expose that many of the attributes between individuals are significantly different in Mogesa (see Appendix Tables C-51 and Table C-52), Amure (see Appendix Table C-53 and Table C-54), Eeyahoo (see Appendix Table C-55 and Table C-56), and Patela (see Appendix Table C-57 and Table C-58). Yet, as previously discussed in Chapter 5, the hide-workers were unable to try to select their own scrapers in a sorting test. This suggests that the individual differences are unconscious.

Importantly, there is not any consistency concerning which variables identify individuals. Most individual differences (in a total of 121 tests for each attribute) occur in the comparison of length (52 percent), breadth (37 percent), proximal thickness (53 percent), and breadth/length thickness (31 percent). These attributes may be more constrained by the socket, especially when individuals share a handle,

than attributes such as distal thickness and retouch length. Furthermore, most of the differences between individual scraper measurements are less than one millimeter and this would be very difficult, if not impossible, to see visually.

In addition, t-tests of individuals' used-up scrapers in each village comparing their mean morphological measurements indicate that many of the attributes between individuals are significantly different in Mogesa (see Appendix Tables C-59 and C-60), Amure (see Appendix Tables C-61 and C-62), Eeyahoo (see Appendix Tables C-63 and C-64), and Patela (see Appendix Tables C-65 and C-66). For the used-up scrapers, the insignificant to significant ratio is 2.5:5.2 for all 770 of the individual t-tests, indicating that there were twice as many significant differences as insignificant differences. However, similar to the unused scraper differences between individuals, there are not consistent attributes which identify individuals and the used-up scraper differences are usually less than 1 mm in size. This would make it difficult to believe that these differences express conscious/deliberate efforts by individuals to make their scrapers different from others. Most likely unused and used-up scrapers express individual differences because as human beings we are incapable of producing exact replicas; there will always be some degree of internal variability.

Ideal Types

Each of the villages has a hide-worker who they believe is the best knapper. In Mogesa it is Tesfy, in Patela it is Tina, and in Amure it is Bedala. Tesfy has been knapping for 8 years, Tina for 12, and Bedala for 5 years. The hide-workers state that these individuals are the best at achieving a good working edge.

The mean measurements for Tina and Bedala's unused scrapers are closest to representing their village means in all three dimensions (length, width, and thickness), however Tesfy's scrapers are significantly longer than those of his village mean (Table 7-1). While Tina and Bedala's scrapers may be seen to represent the ideal type, Tesfy's cannot, unless the ideal type is not being represented by the village mean. Tesfy does have the thinnest distal edge mean in his village at 0.36 cm, Tina's scrapers have the exact same distal edge thickness (but it does not represent the thinnest in the village), and Bedala is close at 0.37 cm. In terms of edge angles, the three selected as the best knappers all have unused distal edge angles that represent the village mean, which suggests an ideal distal working edge type for each village. Tesfy also maintains a working edge up to a mean distal working edge angle of 71°, Tina also to 71°, and Bedala to 65°. Tesfy and Tina's distal used-up edge angles are the highest means in their particular village. Bedala who is less experience only has a mean of 65°, while two other hide-workers in his village have a higher edge angle mean at 75° (Mardos and Chamo), but their overall scraper morphology and unused distal edge angle do not fall closely to the village mean.

Table 7-1: Unused scraper comparison between the village mean measurements and the village's best knapper's mean measurements.

	Mean Length	**Mean B/L Ratio**	**Mean T/L Ratio**	**Mean Distal Edge Angle**
Patela village	2.7	0.85	0.12	48
Tina	2.7	0.87	0.13	48
Amure village	3.7	0.67	0.10	53
Bedala	3.7	0.69	0.10	53
Mogesa village	4.2	0.62	0.09	50
Tesfy	4.6	0.60	0.07	49

A hide-worker is singled out in each village as the best knapper and there was no hesitancy in selection, even though it was an etically derived question. However, it was bolstered through observations, as I often witnessed before I asked the question, that these individuals (Tina, Bedala, and Tesfy) were turned to when a hide-worker had trouble getting a good working edge on a particular scraper. In conclusion, the scrapers of these three hide-workers come closest to reflecting the mean for the village in terms of length, breadth/length ratio, and thickness/length ratio, indicating that they are perhaps achieving and respected for creating the ideal type in their respective village.

Experience and Age

The only indication of experience and age that I saw reflected in the Gamo scrapers was connected with spurs and breaks. The creation of what archaeologists have termed graver spurs or on the distal corners of scrapers is created during resharpening (see Chapter 2 Figure 2-4). The hide-workers informed me that they are purely accidental and have no secondary function, nor do they help in the hide-working processes. Instead, the hide-workers do not like spurs because they may catch and rip the hide. Flake scars on the backside of a spur are the result of shaping the laterals for hafting.

Hide-workers of any age can create spurs, but in all four villages, it is the older and younger individuals, who had a higher occurrence of spurs. It should be clear though that even the best knappers at times create spurs on their scrapers. At Mogesa, the older hide-workers, Buta (22.8 percent) and Yeka (23.5 percent), had the highest

percentage of spurs on their used-up scrapers. At Amure, the least experienced hide-worker, Mardos, had the highest percentage of spurs at 28 percent of his used-up scrapers. Hagay is partially blind and had the second highest occurrence of spurs at 14 percent. At Eeyahoo, Arba, the least experienced hide-worker, had the most spurs at 2.7 percent. At Patela, Uma, Gaga, and Abata have only been making scrapers for 3 years or less and produce spurs on 6 to 7 percent of their scrapers. Darsa is the eldest hide-worker and has a high percentage of spurs (8.3 percent), Garbo though has the highest at 12.5 percent perhaps because he suffered from an eye infection and could not see well. The lower percentage of spurs on *tutuma* scrapers (Eeyahoo and Patela villages) may be the result of using the laterals for working edges, which eliminates the frequency of spurs. I believe that spurs occur more frequently on the scrapers of older and younger hide-workers because they have less strength and/or less control over the material. In a chi-square test, the number of scrapers belonging to elder and younger individuals with spurs was significantly different from those who are middle aged (see Appendix Table C-67).

Younger individuals were especially prone to more scraper breaks than older individuals. The *tutuma*-using hide-workers have very few breaks compared to the *zucano*-using villages, probably because the scraper is more likely to fall out in the absence of a mastic medium. At Patela, only Abata and Arka experienced breaks. Abata is the youngest of those learning to scrape hides and had a 6.25 percent (n=1/16) breakage rate, Arka had a near 4 percent (n=1/25) and claimed that his scrapers were breaking because of poor material, but it may also be his age, because he has been scraping for thirty years. At Eeyahoo, Arba the least experienced knapper

also had the highest percentage of breaks at 10 percent (n=5/50). At the *zucano*-using villages of Mogesa and Amure, it was also the least experienced hide-workers who had the highest rate of breakage. At Mogesa, Mola (38 percent, n=8/21) and Yonja (19 percent, n= 4/21) had the highest percentage of breaks and are the least experienced hide-workers. At Amure, Mardos (24 percent, n=6/25) and Chamo (26 percent, n= 5/19) had the highest proportion of breaks. In a chi-square test, the number of broken scrapers belonging to younger individuals (early 20s and less than 5 years experience) was significantly different from those who are older and more experienced (see Appendix Table C-68).

In a coefficient of variance analysis, I also compared the standard deviations of individuals to determine if more experienced individuals had less variation in their scraper length, breadth, distal thickness, and proximal thickness for unused and used-up scrapers (Figures 7-26 and 7-27; see Appendix Tables C-69 and Table C-70). I expected that younger individuals would have more variation in their assemblages because of their inexperience. However, I found that there were not patterns associating the amount of variation in an individual's assemblage and his experience, which is surprising. There was only slightly less variation among individuals who had over 20 years of experience than those with less experience. Perhaps though the fact that elder and more experienced hide-workers help younger and less experienced hide-workers with producing and resharpening creates a difficulty in discerning the amount of variation based on age.

Hence, age and experience are reflected in the presence of spurs and breaks, which demonstrate a lack of experience with the material and perhaps a lack of

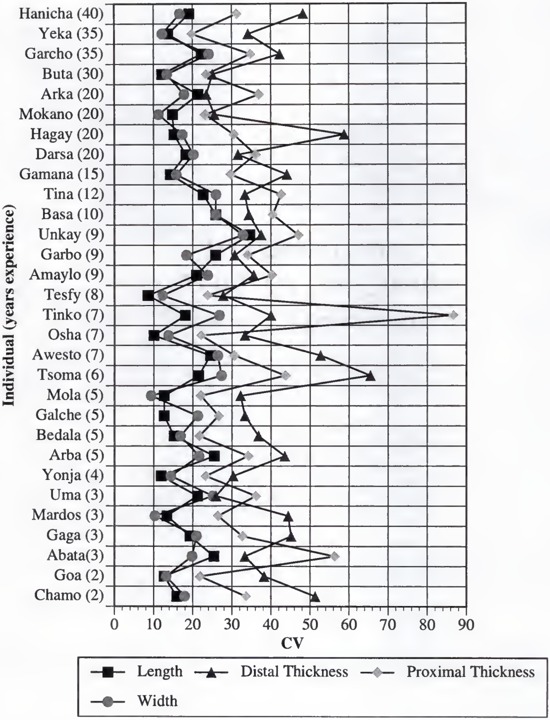


Figure 7-26: Graph comparing the unused scraper coefficient of variance of length, width, distal thickness, and proximal thickness.

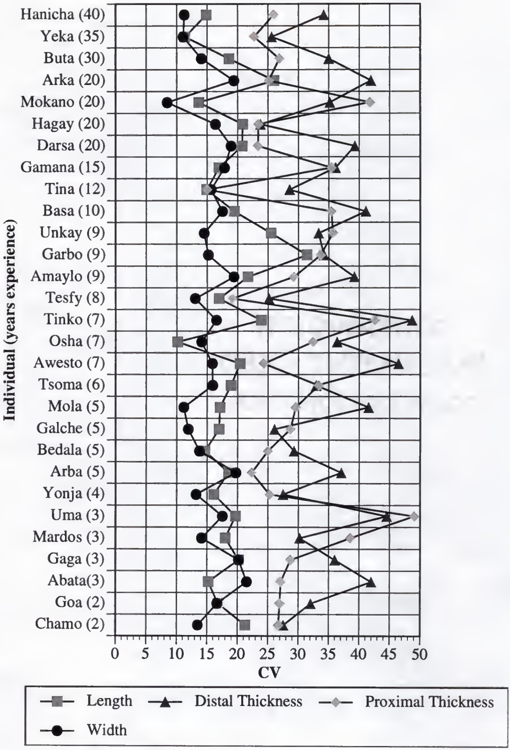


Figure 7-27: Graph comparing the used-up scraper coefficient of variance of length, width, distal thickness, and proximal thickness.

strength in older hide-workers. Unexpectedly, the amount of variability within an individual's assemblage did not decrease with age or experience. This may be the result of elders aiding younger hide-workers with their scraper production and maintenance.

Handedness

In my in-depth study of 29 hide-workers in the four villages, I found only one individual (3 percent) who knapped left-handed. Left handedness varies in a population between 3 to 35 percent (Annett 1977). The small number of left-handed hide-workers I encountered is probably largely due to culture proscriptions against left handedness among the Gamo and in Ethiopia, in general. The left-handed hide-worker lives in the village of Patela. Despite the fact that he is left-handed he is considered the best knapper in the village and often helps less experienced hide-workers with knapping. The only difference noticeable in Tina's scrapers from the other Patela hide-workers is his increased tendency to use the left lateral edge as a secondary scraping edge preferable over the right lateral edge selected by other hide-workers in his village. He also did not have any scrapers that had platforms located on the ventral left, while all the other right-handed hide-workers in the four villages did. However, Tinko and all the right-handed hide-workers have platforms located on the ventral right.

It has been hypothesized that flint-knappers generally hold a flake with their thumb over the bulb of percussion serial flaking from left to right and rotate the stone clockwise while flaking (Toth 1985). Therefore, in this scenario, more cortex remains on the right dorsal location of the tool, if a right-handed person makes the tool. Many

of the Gamo scraper platforms (70 percent) are shattered during production and it is not easy to determine where the original platform was in relationship to the working edge. Thirty percent of the platform locations were discernable and of these three-fourths were located on the ventral proximal position in relation to the working edge, the remaining ten percent were predominately lateral ventral locations. Most of the Gamo scrapers had little cortex remaining once the scraper was fully formed. However, I did collect 293 right-handed made scrapers and 17 left-handed made scrapers with cortex present on the dorsal side (Figure 7-28).

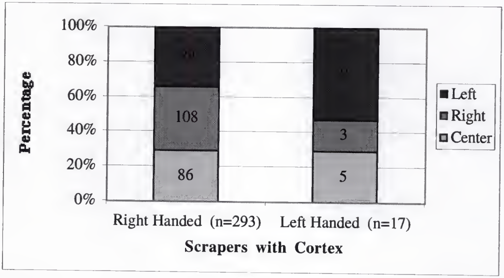


Figure 7-28: Graph comparing handedness and the location of cortex on Gamo scrapers.

My results indicate that the left-handed individual did frequently leave cortex on the left side of the scraper, however the sample size is small. In addition, the larger right-handed sample size indicates an even split between the presence of cortex on the

left and right side. I also had many scrapers that had cortex only along the dorsal center ridge, probably a result of shaping all sides for hafting in *zucano* handles, and use of lateral edges for scrapers hafted in *tutuma* handles. My study suggests that it is very difficult to determine handedness for flaked hafted tools based on platform and cortex locations.

Discussion

The importance of patrilineal relationships is expressed in virilocal post-marital residence patterns, which creates spatial organization reflecting father-and-son domestic/learning groups. Furthermore, with the expressed importance of kin relationships, there is little individual competition concerning hide production or scraper production. Hide-workers tend to scrape hides for the same *mala* and *mana* individuals who their fathers worked for within their village. They rarely sell their scraped hides (because they do not own them) at the market, where a more competitive atmosphere would be created concerning quality.

Close (1977) offered that stone tool morphology most closely reflects learning groups. My own study suggests that the morphology of both unused and used-up scrapers reflect the teacher-student clustering within a village context. Since the teacher and student are father and son, who live in close proximity, scrapers not only cluster together in terms of morphology but also spatially within a village reflecting domestic groups. Furthermore, one individual in each village was known as the best knapper in the village; usually his scrapers most closely resembled the village

mean (for scraper morphological attributes) and thus were appreciated for their resemblance to an ideal type.

White and Thomas (1972) and later White, Modjeska, and Hipuya's (1977) study of emic typologies among Duna men, who grew up using stone tools in the New Guinea Highlands, indicates the presence of a shared mental template. However, they also pointed out that the ideal types are not rigid and that individual idiosyncrasies and personality traits can be discerned in material culture and related to changes in material culture through time within a group. Scattergram comparisons of breadth and length of unused and used-up Gamo scrapers indicated that there was little individual expression. Although graphically it was difficult to discern individuality in the scrapers, t-tests did bring out statistical differences between individual scraper morphologies. This suggests that individual differences were produced unconsciously, as also supported by pile sorting tests.

Gunn (1975) argued for the presence of idial (individual) style in stone tools in terms of flake scar orientation based on an experimental study of obsidian and glass biface production. Gunn used laser diffraction, which was not a method available to me in the field. Most of the Gamo scrapers exhibit a radial pattern with flake scar orientation varying in relation to its location on the scraper rather than in terms of individual idiosyncrasies. Bonnichsen (1977) and Young and Bonnichsen (1985) argued that individual style is present continuously as a result of decision making during production and use. In particular, they noted differences in flake scars created through individual decisions for applying: buffet (softly abrading), pressure flaking, pressure rub, percussion with soft hammer, percussion with hard hammer, abrading

(grinding), and shearing to projectile points. Although the hide-workers often abrade the distal tip, they do it in preparation to remove flakes from the edge and thus there is little evidence of it. They also only use hard hammer direct percussion and never use any pressure flaking. However, in the village of Patela individual decisions concerning whether to use a lateral or proximal edge for subsequent scraping led to individual variation and little clustering based on domestic/learning groups within the village for used-up scrapers.

Gunn (1975) also determined that the experience of the knapper determined the tightness of the clustering. The experience and age of Gamo hide-workers did not seem to reflect the amount of morphological variation within an individual's assemblage. However, Yeka, who is an elder, scraper assemblage clustered more tightly than others in his village. Experience and age more commonly were reflected in the frequency of spurs and breaks in an assemblage. Another avenue for exploring the individual is research that focuses on handedness. Toth (1985) proposed that right and left handed individuals could be distinguished based on the location of cortex on the tools. However, studies by Patterson and Sollberger (1986) and Pobiner (1999) indicated that both right and left handed individuals produce, in equal amounts, tools with cortex located on the right and left side of the tool. My research bolsters the latter, suggesting that cortex location is not a good indicator of handedness.

Individual expression in stone tool morphology is generally minimal (less than 1 mm), even if it is statistically present between most individuals concerning most morphological measurements. It was more common, however, for differences to occur in distal thickness and retouch length, than in the shape defining attributes such

as breadth, length, and thickness. Individual idiosyncrasies in scraper form provide a future source for changes through time in domestic assemblages. It also demonstrates that variation is inevitable, because as humans it is not possible to create exact replicas (Clark 1968:178). Changes in spatial arrangement of individual households also indicate change and conformity to local trends. This is evident in the analysis of the Eeyahoo scrapers, where individuals moved into the village and have a scraper morphology that differs from their father's. The Eeyahoo hide-workers continue to use the *tutuma* handle like their fathers. However, the spatial distribution of their scrapers reflects in some instances the *zucano*-user pattern rather than the *tutuma*-user pattern. In sum, in cultures where lineage is important and the source of learning craft production, a comparison of household spatial analysis against scraper morphology may reveal domestic/learning group membership.

CHAPTER 8
EXPLORING MATERIAL VARIATION: CULTURAL DIVERSITY AND REPRESENTATIONS IN THE LANDSCAPE

Gamo stone tools clearly illustrate that their morphology and spatial location reflects the heterogeneous nature of intracultural life, expressing both functional and stylistic value. Cultures are not homogeneously bounded entities, but heterogeneous in terms of the activities individuals pursue in relationship to the environment and also their socio-political relationships and identities. Like a stone tool, whose dorsal scars overlap, intersect, and parallel one another, so do the individual's life and identities overlap, intersect, and parallel the lives of others in their society. The edges of the tool are renegotiated with use, just as the boundaries of identities are continually renegotiated. Although no two flake scars or persons are the same, discernable patterns can be drawn out through an understanding of context.

Ethnoarchaeology opens new positions from which to explore emic interpretations concerning the similarities and differences in objects in association with their environmental, social, and spatial contexts. Craft production is limited to specific households within Gamo society. Although smiths, groundstone-makers, and potters produce their wares and sell them at markets, the hide-worker's stone tools remain within the maker's household context. Fathers teach their sons the locations of resources, production, use, and discard of the stone tools involved in their craft. Sons and fathers remain living in the same village, as postmarital residence patterns are

virilocal. Since stone tools are not made for consumption by the public, like ceramics and iron products, they are not subject to consumer preferences and demands that may alter their appearance. Rather than consciously producing stone tools that are different from their neighbors, the Gamo unconsciously create scrapers that differ across households, villages, subregions, and regions, as a direct reflection of learning systems. Both functional and stylistic attributes of variation are dictated and learned within a cultural system. The Gamo hide-workers associate themselves with a variety of identities including ethnicity, *dere* membership, moiety, clan, and lineage and these identities interface with geographic divisions in the landscape and expose the functional and stylistic elements of material variation.

Regional Relationships

Each ethnic group within southern Ethiopia that has hide-workers maintains a unique hide-working technology and associated material assemblage, despite similarity in raw resources (mostly obsidian), activity (scraping hides), handles (mostly double-hafted mastic handles), and final product (bedding). There have been no previous in-depth studies of stone-tool using people, which focus closely on the production, use, and discard of the tool, as well as the reasons behind their continued use and incorporation into the larger social technological systems. An overview of the Gamo hide-workers' social and economic roles within their society contextualizes the meanings behind the types of resources they use and their location on the landscape. Subsequently, when the Gamo hide-working technology is compared to others in

southern Ethiopia the sources for influential similarities and regional differences become apparent.

Social-Economic Context and Resources

The socio-economic context of the Gamo hide-workers offers explanations for the types of resources they use and their location in the landscape. The Gamo artisans (*tsoma*) are held in a traditional patron-client relationship (*mayla*) with the *mala*, which is maintained through social taboos and their symbolic association with the material world. Prescriptive taboos (*goma*) restrict the types and locations of interactions between *mala* and *tsoma*, including marriage, sex, and food. The *mala* consider the *tsoma* impure because of their associated materials, stones and deceased animals, which the *mala* consider to be and/or to cause infertility of land and people. Yet the hide-workers are mediators, who transform the impure hides and stones into useful everyday items, just as they transform infertile people into fertile ones through performing circumcision and mediating social harmony through the announcement of village meetings, weddings, and funerals. The artisans enact critical roles in rituals, which symbolically cool or relieve illness, mediate life, death, and social harmony and instigate human fertility. In turn, these mediating roles ensure the well being and continuance of Gamo society, and integrate the artisans into Gamo society both economically and socially. Over the past four centuries, the Gamo incorporated their own understandings of purity with new religions including Orthodox Christianity, Protestantism, and Islam. In order to become members of an organized religion, the hide-worker must give up his/her "impure" occupation and social roles in society,

especially in the Orthodox and Protestant churches. Both of the latter advocate the discontinued use of blowing the horn for ceremonies and traditional means of circumcision and healing. Furthermore, the Italians introduced western medical clinics, which now perform many circumcisions and offer other medical services. The subsequent socialist government prohibited the enactment of local ceremonies, such as rites of passage and divining. The prohibition of traditional artisan roles threatens their sources in food security and the social harmony (albeit discriminatory) in which they depend for existence.

The concept of the hide-workers as impure within Gamo society not only affects which materials they use, but also determines their position on the regional landscape. The association of the hide-workers with impurity means that they are not able to bury their ancestors in the community mourning ground or in church graveyards. They are allowed to bury their ancestors only within their household gardens, because the *mala* fear that they would pollute their own ancestors if buried together. They are given very poor, infertile land to live on and hence hide-workers tend to live in clusters on the edge of villages on steeply graded slopes and on poor soils. Stones are thought to cause infertility and impurity, and the *mala* do not tolerate them in their fields or near their households or gardens. The context of stone tools within and near specific clustered households in a village on poor soils and steep grades within a region offer clues to future archaeologists for discerning craft production areas of low status within a known cultural region.

The Gamo historical interactions with other societies also have affected their material culture. Geographically the Gamo territory is surrounded by lowland plateau

and is clearly definable spatially from neighboring ethnic groups. Yet, they are not culturally bounded or segregated from their neighbors either in the past or today. Currently, the Gamo primarily only scrape cattle hides. Wild animal hides and goat and sheep hides are no longer scraped for several reasons. First, the national government of Ethiopia made it illegal to kill wild animals and the animals are becoming very rare. Second, Addis Ababa tanneries pay high prices for raw unscraped goat and sheep hides from the rural areas and so goat and sheep hides are rarely made into local products. Third, the products made out of wild animal hides and goat and sheep hides, such as clothing, rope, and bags, are being replaced with western products. Today, the Gamo scrape hides predominately to make bedding, and an occasional musical instrument or cape. Hence, within Gamo society and in southern Ethiopia in general, there is a decreased demand for hides because of the influx of western products, which limits most hide-working to a part-time occupation. Today although some hide-workers have land, the planting seasons coincide with the seasons best for stone quarrying. Thus, it is difficult to maintain substantial crops while also scraping hides. Furthermore, with the end of the socialist government, some hide-workers are again losing their land. They are exceptionally poor for rural peoples and are unable to attend school, which would offer them opportunities to obtain local or national government positions. Hence, they continue to scrap hides with stone as a part-time occupation because of the lack of other economic opportunities.

The Gamo are unique in southern Ethiopia for their use of two handle types to haft their scrapers, which is probably in part related to interethnic relationships. The

Gamo use a double-hafted handle (*zucano*), and the Cushitic Sidama, Cushitic Hadiya, Ethio-Semitic Gurage, and Omotic Wolayta also use this handle form. Other Gamo hide-workers use a single-hafted handle (*tutuma)* like their Omotic neighbors, the Oyda. The Gamo handles are most similar to the handles of the Wolayta and Oyda. All three of these ethnic groups are Omotic-speakers, who share an ideology concerning the mediating role of hide-workers in marriage, initiation, and death ceremonies. This suggests material worlds are fluid and flexible between ethnic groups that share a common ideology. Yet, the latter does not explain the widespread use of the double-hafted handle among the linguistic and culturally diverse southern Ethiopian societies. There is little known about the history and especially the prehistory of southern Ethiopia, but what we do know may help offer an explanation for the similarities in material culture. Oral histories among many of these ethnic groups suggest that artisans are not indigenous but an immigrant population (Haberland 1984; Hallpike 1968; Levine 1974). Between the twelfth and eighteenth centuries the Ethiopian state was redefined to include the southern people of Ethiopia including the Hadiya, Sidama, Gurage, Wolayta, and Gamo (Marcus 1994:19-29; Shack 1966:17; Bureau 1976, 1979). The military, church officials, and civil servants also required fine cloth, jewelry, weaponry, shields, etc., which only craft specialists could supply. It may be that similarity in handle type among many southern Ethiopian societies was influenced during this feudalistic period, when the northern peoples brought their own artisans or preferred technology with them. However, it should be made clear that artisans in each ethnic group speak the same language and share the same cultural traits with the farmers of their respective ethnic groups. Future research concerning hide-

working and other craft specializations is needed to explore the historical and material links between the ethnic groups of southern Ethiopia.

Stone Tools

The Gamo scrapers serve as an example to demonstrate the concept that culture limits function as much as it does social representation. Gamo scrapers vary in relation to raw material selection, their uselife, and the activities in which they are used, including scraping and chopping, and use on highland and lowland cattle hides. These activities are unique to Gamo hide-workers and are as much an ethnic marker as a functional one.

Importantly, the study of Gamo hide-working material culture demonstrates that cultural practices rather than raw material determine stone tool morphology. Despite the presence and use of different types of stone materials, the Gamo make a specific scraper type, which is uniquely their own. The local ecology provides some unique opportunities for the Gamo hide-workers. Most southern Ethiopian hide-workers, including the Sidama, Hadiya, Wolayta, and Gurage, who use stone, make their scrapers from obsidian. However, the Gamo region is rich in cherts rather than obsidian. The Gamo obtain obsidian through trade with the Wolayta. The only other ethnic group studied to date, which uses two types of stone material are the Konso, who use chert and quartz. The Gamo are unique in that they use both chert and obsidian resources. The Gamo make their obsidian scrapers slightly longer than their chert scrapers because obsidian fractures more easily, affecting the reduction rate of the use edge. During use, the obsidian scrapers are reduced more than chert scrapers.

The Gamo used-up chert and obsidian scrapers have similar morphologies, which are statistically and visually indistinguishable concerning all measured attributes. Hence, the Gamo share a common idea concerning the morphology of unused and used-up scraper form.

Although stages of use are discernable in terms of scraper morphology and context within Gamo society, each ethnic group expresses its own unused and used-up morphology. Within all Gamo hide-working households and nearby contexts, there are both unused and used-up scrapers. Specifically, used-up scrapers are shorter, have more rounding along the working edge, have a higher edge angle, and more depth to their retouch scars. The Gamo consciously distinguish unused from used-up scrapers. Furthermore, they are able to list specific attributes such as length, dullness of the edge, and thickness to differentiate the stages of scraper use. The unused and used-up scrapers of other ethnic groups such as the Konso, who also use chert, and the Sidama, Gurage, Wolayta, and Hadiya, who also use obsidian are distinct from the Gamo scrapers (Brandt et al. 1996). Each ethnic group has a unique unused and used-up scraper form despite similarities in raw material.

The Gamo will use a single scraper for both chopping and scrapping activities, while other ethnic groups such as the Sidama and Gurage produce two distinct scrapers specifically for these activities. The Gamo scrapers that are used for both scraping and chopping are statistically different from those used only for scraping. The presence of chopping within Gamo technology is the result of the seasonal availability of chert and hides. Gamo cherts are available only during the rainy season when they erode out of their basaltic formations. Rather than collecting chert during

the rainy season and storing them for when hides are available, the hide-workers choose to store the hides until cherts are available. They do not like chert that has been exposed to the air for long periods because it forms a patina, which makes for a duller edged tool. When the hides dry, the edges shrivel up, becoming tough and the hide-workers use a specific activity, chopping, to reduce the edge of the hide. Scrapers used for chopping at the hide tend to have a thicker distal edge and longer retouch scars because the working edge needs to be duller and smoother. These differences in the used-edge (thickness and length of retouch scars) of the Gamo scrapers is something present on a selection of scrapers in all Gamo hide-worker households, so these attributes are both an ethnic marker and a functional one.

Furthermore, because the Gamo region contains both a highland and lowland area, all the Gamo hide-workers scrape highland and lowland cattle hides. Other ethnic groups, to our current knowledge, do not scrape both highland and lowland cattle hides. The *Villagization* plans of the socialist government opened the lowlands for occupation by the highlander Gamo. This probably resulted in the increase scraping of lowland hides. The type of hide scraped affects the distal edge of the scraper. The hide-workers stated that lowland hides are thicker and take longer to scrape. They consciously recognize that individual scrapers may be used longer on lowland hides causing the distal edge to be thicker with more resharpening scars.

Within every Gamo hide-working household context, there may be difference in the scrapers based on their stages of use and in the working edge due to the scraping of lowland and highland hides, as well as chopping verses scraping activities. There were no other morphological differences in terms of length, width, edge angle,

proximal thickness, etc., which were affected by these differences in activities, because the Gamo do not make specific scrapers for chopping, scraping or for lowland and highland hides. These activities are unique to Gamo society, and reveal the rich functional variation that can be unique to a single ethnic group. There are also other significant differences in the hide-working materials and technology between the Gamo and other ethnic groups. The amount of time spent scraping a hide, the number of scrapers used to scrape a hide, the amount that a scraper is reduced during scraping, the location of procurement, production are specific to each ethnic group (Brandt et al. 1996; Brandt and Weedman 1997). Hence, each ethnic group's hide-working practices reveal differences not only in their scraper morphology, but also in the related technology. Function and style are unique to each ethnic group and are difficult to segregate from context.

Subregional

The Gamo scrapers demonstrate that morphology varies based on intraethnic group membership. Archaeologists focusing on lithic studies tend to regard cultures as homogenous, and hence they view any intracultural variation as a difference in function rather than in group membership. Cultures are heterogeneous, and the Gamo have three subregional territories -- south, central, and north and ten political districts-*deres*. The three subregions are different in terms of the types of local political leaders and the responsibilities of artisans. The central Gamo share cultural features with both the southern and northern Gamo and hence their material culture reflects their medial position between the northern and southern Gamo subregions. External relationships

such as the extent of the involvement with the national market systems and relationships to other ethnic groups have also differentially affected the Gamo subregions.

Within Gamo society, there are regional differences in the types of materials used for scrapers dependent on local environments and external socio-economic relationships. The Gamo use glass, iron, chert, and obsidian as scrapers, but the distribution of these resources is different across the landscape (Table 8-1). Primarily the central Gamo use glass. In the past, many of the central Gamo had to purchase chert at the market place because they had no local resources. Integration into national trade systems expanded with the socialist government of the 1970s, increasing the presence of industrially manufactured goods such as bottled beer, soft drinks, and water within the Gamo region. The hide-workers, who previously obtained their stone resources by purchasing it in the market, are finding even though they prefer stone, they use glass. They simply pick up pieces of broken bottle glass, which is now common on the surface of towns, to use for scrapers. The Ganta and Kamba hide-workers of the southern Gamo region use iron. Kamba borders with other Omotic ethnic groups such as the Male and Gofa, who also use iron. Today chert and obsidian stone scrapers are used primarily by the southern and northern hide-workers. The Gamo obtain obsidian through trade with the Wolayta, and hence it mostly appears in the assemblages of the northern Gamo, who live the closest to the Wolayta.

The subregional distribution of handle types among the Gamo is not environmentally dictated, but instead is related to external (see above discussion under Regional subheading) and internal social relationships. As previously stated, within

Gamo society the hide-workers use two different handle types. The southern and central Gamo hide workers use the *tutuma* handle and the northern Gamo hide workers use the *zucano* handle, to do the exact same work (Table 8-1). The central and southern Gamo live in a predominately highland region and the *tutuma* handle is usually made of highland resources. In contrast, the *zucano* handle is primarily made out of lowland resources, and used by the northern Gamo who live in a lowland environment. However, there is not a clear-cut division of the highland and lowland regions into the cultural subregions of the Gamo. For example, there are northern Gamo hide-workers who live in a highland area and southern and central Gamo who live in a lowland area. Yet, they use the handle type of their subregion rather than being dictated by the local environment.

Table 8-1: Comparison of subregional handles, raw materials, scraper types, and spatial distributions.

Sub-region	Handle Type	Raw Material	Unused Scraper Type	Location of Production	Location of Scraping	Location of Discard
North	*Zucano*	Obsidian & Chert	Formal	At quarry	Inside household	In household in specific trash pits
Central	*Tutuma* & *Zucano*	Chert & Glass	Informal	At household	Outside household	In garden
South	*Tutuma*	Chert & Iron	Informal	At household	Outside household	In garden

The distribution of handles is related to intraethnic social relationships. In the past, the central Gamo used two-different handle types, the *zucano* like the northern

Gamo and the *tutuma* like the southern Gamo (Table 8-1). Culturally there are overlaps in the roles of artisans between the three regions-north, central, and south. The central and southern Gamo hide-workers perform circumcisions, healing, and act as messengers, while the northern hide-workers do not. In addition, the central and northern hide-workers belong to a separate caste group from the potters, while in the south hide-workers and potters belong to the same caste group. Although there are hide-workers in the northern region who use a *tutuma* handle, they recently moved into the area from the central Gamo region. Furthermore, there are central Gamo hide-workers who use a *zucano* handle. In the past, the central Gamo used both handle types for two different functions (*zucano* for cattle hides and *tutuma* for goat hides). Today, they have ceased to use the *zucano* type handle because the cost of acquiring those resources exceeds their demand and payment for hides. The only the central hide-workers who continue to use a *zucano* handle today, have marital ties with hide-workers in the northern region.

The presence of the two handle types is associated with the presence of two different scraper types and site formation processes among the Gamo (Table 8-1). Archaeologists confronted with the Gamo lithic assemblage probably would interpret these differences either as representing two separate cultures or as the result of functional differences. For instance, archaeologists might assume that the presence of two scraper types represents a difference in access to resources. Archaeologists postulate that direct access to resources leads to a curated tool form and indirect access leads to an informal tool form (Henry 1989; Parry and Kelley 1987; Shott 1986). This pattern does not hold true among the Gamo. The informal scraper hafted in a *tutuma*

handle and the more formal scraper hafted in a *zucano* handle are both procured through direct and indirect sources. Gamo handle and scraper types are not the result of availability of stone resources. Hence, the presence of two different scraper morphologies and site formation process among the Gamo is exciting for its implications that stone tools used within a single culture for the exact same function can express significant variation based on internal social differences.

The *zucano* closed-mastic hafted scrapers have a formal stone tool morphology with shaping of the working edge, the laterals, the proximal, and sometimes reduction of the dorsal ridge to fit the scraper into the closed haft. The used-up *zucano* scrapers sometimes have an undercut as the result of resharpening in a mastic haft. If they break during use, they usually break at the medial. Furthermore, only a single edge, the distal, is used for scraping and resharpening. The shaping scars on the laterals the *zucano* -hafted scrapers are much shorter in length, than the retouch scars left on edges that have been used and resharpened. The formal nature of the *zucano* scrapers leads to difference in the spatial location of production, use, and discard activities (Table 8-1). *Zucano* scrapers are shaped at the quarry and kept safely inside the household. Therefore, only scraper blanks, scrapers, and retouch flakes are found in and nearby *zucano* households. The hides are scraped inside the household, which means that retouch debitage is present on the house floor. The scrapers are removed near the hearth inside the house, and can often be found lying on the surface. Occasionally, they sweep the floor moving retouch and scrapers to the edges of the household, and they also sweep them onto an enset leaf and then place them in specific lithic-only

discard piles. These are located outside the household, usually in thorn bushes near footpaths.

In contrast, the scrapers of the open-nonmastic *tutuma* handles express an informal morphology with little if any shaping of the flake when first hafted (Table 8-1). The used-up *tutuma*-scrapers are also different from the *zucano* used-up scrapers. *Tutuma*-using hide-workers use multiple sides of the scraper for scraping. This creates deeper retouch scars and steeper edge angles on several sides of the *tutuma*-scrapers, which contrasts to the single use-edge of the *zucano*-hafted scrapers. Furthermore, when the *tutuma*-hafted scrapers are broken, they tend to break in a variety of ways and not just at the medial. Furthermore, the materials from the entire reduction sequence of the scraper can be found within the context of a *tutuma*-using household. They shape *tutuma* scrapers at the household right before use and keep the nodules of raw material outside. *Tutuma*-users scrape their hides outside in their enset gardens rather than within their household. The hide-workers produce, use, and discard scrapers within their enset garden.

In addition to differences in handles and scrapers related to the cultural subregions, each of the ten Gamo *deres* (political districts) has a distinct unused and used-up scraper form. Each *dere* is separated from its neighbor by a river or mountain ridge. There is some debate concerning whether each of these *dere*s represented an independent kingdom in the past or not, and were currently united under the force to defend themselves against the Amhara in the 16th century (Abeles 1981; Straube 1963:381). Today, the Gamo people closely identify themselves with their *dere* membership because it is the *Kao*, who makes sacrifices to the ancestors to ensure

fertile crops, animals, and people for his *dere* membership. Furthermore, most hide-workers live and marry within the same *dere*. The handle morphology of the different *dere* scrapers cluster in terms of regional membership and exchange relationships. For instance, Kogo, Doko, and Borada *zucano* handles share a similar morphology, and Kogo and Doko handles were purchased from makers in the Borada *dere*. In addition, Borada *tutuma* handles are most similar to those from Kogo, Zada, and Doko, where the owners of the Borada *tutuma*s came from. Most significantly is a statistical difference of the shape defining ratios (e.g., breadth/length and thickness/length) corresponding to each *dere* for both unused and used-up scrapers. This suggests a shared mental template concerning scraper form on the *dere* level.

Conformity to a *dere* or regional type was explored in my study of three hide-workers who moved from the *dere* of Kogo, where *tutuma*s are used, to the *dere* of Borada, where *zucano*s are primarily used. These hide-workers continued to use a *tutuma* handle and produce *tutuma*-like scrapers, as their fathers did in Kogo. However, some aspects of their household spatial arrangement resembled the Borada-*zucano* pattern. They scraped their hides inside rather than outside and they had specific discard location for their scrapers rather than throwing them in their enset garden. The Kogo hide-workers could not just move to a new *dere* and *mota* without permission. They needed the local government or a *mala* patron to allocate land to them, and they had to have the permission of the residing hide-workers. Generally, hide-workers can only move into a village where they share the same clan name, because resources are shared between members of the same clan. In this instance, two of the hide-workers did not have the same clan name as the residing hide-workers, but

their sisters married men of the residing hide-worker clan. Therefore, they were able to move to the new *dere* and *mota*. The Kogo hide-workers were grateful for the land that was granted to them by the people of Borada.

Differential social and economic interactions between the Gamo subregions and their Omotic neighbors have led to distinct scraper forms and spatial distributions. Furthermore, marriage patterns and resource availability has also affected intraethnic distributions of material culture. This suggests that archaeologists looking at a single cultural group should not assume that morphological differences in stone tools represent different functions, but instead may be fine grained indicators of internal social differences.

Intervillage

Intracultural variations in stone tools also express differences between members of different villages. Studies linking residence and artifact variation are common among ceramic studies, but are virtually absent among stone tool studies. Village hide-workers are typically the members of a single lineage, who learn hide-working skills from their fathers. They unconsciously create a distinct scraper form that reflects their descent groups including moieties, clans, and lineages.

Endogamous kinship relationships associate the hide-workers with impurity and landlessness, which fastens them into their craft occupations and segregates their descendants from others in society. The hide-workers' ancestral-clan totems symbolically articulate their low social status within Gamo society. The names of the first *degala* ancestor (Impure Protect Me) are directly contrasted to the first *mala*

ancestor (Priest Wealthy/Landowner). In addition, *goma* (taboos) prevents the marriage between *degala* and *mala* members, yet they share the same clan names. This is explained through the idea that landless *degala* received their current clan names from the *mala* who gave them land to live on and food. The *degala* hold true to the proscriptive rules that disallow marriage to an individual of one's father's clan, and usually marry women from the opposite moiety.

Although there is no conscious effort to make scrapers different from the opposite moiety or from other clans, there are statistical differences. Learning patterns and residence are linked, creating difference in the material culture and its spatial location at the clan and moiety level. Each *dere* has hide-workers belonging to both moieties, which allows for intra*dere* marriages. Since hide-workers learn their craft from their fathers instead of their father-in-laws, there is little exchange of information concerning hide-working between members of different clans and moieties. Consequently, the handle and scraper morphologies of the Gamo moieties and clans were statistically different in almost all morphological measurements.

The hide-workers do not consciously produce scrapers that are different from other villages. Since their fathers and uncles teach them, they produce scrapers that are similar in form. It is the overall scraper form, rather than specific attributes, which define social group membership. Each village has scrapers that are internally similar, especially in terms of breadth/length and thickness/length ratios. However, there are clear differences in unused and used-up scraper morphologies between villages indicating that lineages share a mental template concerning scraper form and appropriate scraping and resharpening practices.

Although they unconsciously produce unique scrapers representing their social groups, the hide-workers are able to recognize their own scrapers based on raw material color. This is not a result of limited color variation within different quarries, but because stone tool-makers prefer specific colors associated with better fracturing. Each village of hide-workers uses one or two specific chert sources, which are not shared with hide-workers from other villages. Hide-workers are extremely protective of their stone quarries. At each quarry, there is one particular color of chert that is generally thought to be more glass-like and is the favorite of the hide-workers. The hide-workers were able to select their own village scrapers from others in a sorting test, because of the color of the chert. My study shows that statistically chert color does tend to correlate with village membership. However, detailed studies of quarries and the quality of cherts produced is still needed to assess whether this is a true difference based on resource quality, or, as I suspect, local choice.

In sum, moiety, clan, and village scrapers are morphologically distinct because each village represents a single lineage of hide-workers, who have learned the craft from their ancestors. The learning context provides a similarity in mental template, which in turn results in an unconscious similarity in scraper form within a lineage, clan, and moiety.

Household and Intravillage

The strong stress on clan and lineage membership in Gamo society led me to suspect that scraper morphology would represent learning groups, but not individual expression within the village context. However, I found that in addition to learning

groups, age, experience, and the individual were expressed in scraper morphology, although handedness was not. The presence of individual expression in stone tools heightens the importance of maintaining a thorough understanding of the context of the tools being compared. Archaeologists have not previously explored the importance that age and experience may have on the formation of artifacts, and for this reason, they have mistakenly attributed breakage patterns and spurs to differences in quality of resources and activities.

Examination of scrapers in household clusters within a village reveals the presence of learning groups and virilocal residence patterns. As a product of virilocal residence, the hide-worker households cluster in terms of patrilineal descent, so that fathers and sons live near to one another. Within a village, there is similarity in scraper form expressed within teacher-student groups, which are statistically different from other teacher-student groups within the village. Since the teacher and student are father and son, who live in close proximity, scrapers not only cluster in terms of morphology, but also spatially within a village reflecting domestic groups. Fathers and sons share discard piles and often share a scraping frame, especially when the younger hide-worker has just married. Hence, individuals of the same teacher-student group share activity and discard areas and their scrapers are more similar to one another than to others in their village.

Although, there is no competition between village hide-workers to obtain raw materials and produce "the best scraper," in each village there is a hide-worker who is considered the best knapper. Each lineage has a concept of an ideal type or perhaps an acceptable range for scraper morphology within a village. Hide-workers are primarily

concerned with fitting breadth and thickness for fitting the scraper in the haft and the distal edge thickness and sharpness for scraping. The scrapers belonging to the best knapper in a village most closely resemble the village morphological means, especially concerning distal edge angle and thickness, and thus perhaps the village ideal type. This individual is often requested by others to aid in scraper production and resharpening, especially when the material seems difficult to work.

Individual idiosyncrasies produce scraper forms that are unique to the individual maker. There are statistically significant differences between the scrapers of individuals living within the same village. Yet, in an assemblage containing their village scrapers, hide-workers were unable to select out their own scrapers. This suggests that there is little conscious effort placed on expressing individual identity within a scraper's morphology. Although statistically significant, the morphological differences are so small at less than 1 mm that in most cases they would be visually indistinguishable.

Furthermore, there are clear signs of individuality expressed in scrapers in the presence of spurs and breakage rates. Younger and older individuals more frequently produced accidental spurs because of their inexperience or waning strength. In addition, younger individuals, especially those who had worked for five years or less, were more likely to break their scrapers than more experienced individuals. This is significant because these features have previously been ascribed to aspects of functional variation.

Lastly, there is no indication that handedness is visible in flaked-stone tools. A study of platform and cortex location indicates that there are similar patterns among

right handed and left handed hide-workers. However, in Gamo society the percentage of hide-workers using their left hand to knap with is low (3 percent). I suspect that this is the result of cultural stigmatism against left-handed persons. However, in one village the individual considered the best knapper is left handed.

To bring us full circle, it should not be forgotten that every Gamo household retains scrapers that reflect functional differences. For instance, within the household there are unused and used-up scrapers located in specific contexts, which are dependent on the hide-workers' subregional location and handle use. Each household also has scrapers that have distal edges that differ based on their use on highland and lowland cattle hides or their use for chopping and/or scraping.

Significant Attributes and Scales of Analysis

Archaeologists who tend to segregate stylistic and functional variation also attempt to decipher which attributes represent style and which represent function. I hope that it is clear by now that both aspects of variation are present within a single technological system. It is therefore difficult to segregate attributes into either stylistic or functional meaning without also incorporating an understanding of context.

This study only examined variation associated with an unifunctional form: a scraper for cattle hides to produce bedding. However, within this system there are notable differences in activity. Scrapers with functional variation are present in all household assemblages and include differences in stages of use, type of hide, and type of scraping activity. Differences in stages of use, i.e., between unused and used-up scrapers expressed statistically significant variability in almost all dimensions

including length, thickness, depth of retouch, breadth/length ratio, thickness/length ratio, edge angle, and cross section (Table 8-2). Interestingly, the tools are not reduced enough through the life cycle to produce a significant decrease in weight. In addition, the scrapers are rarely altered on the laterals (exception for some *tutuma*-hafted scrapers), and hence there was not a significant difference in breadth between unused and used-up scrapers. It is notable that the most significant differences in scraper morphology associated with differences in types of activities such as scraping verses chopping and hide type tended to be associated with changes in distal working edge, especially edge thickness and retouch depth (Table 8-2).

A comparison of scraper morphology across different social group contexts indicates that shape-defining attributes such as breadth, length, thickness, breadth/length ratio, and thickness/length ratio are the most useful for identifying style (Tables 8-3 and 8-4). If we compare Tables 8-3 and 8-4, it is evident that used-up scrapers (Table 8-4) have fewer significantly different variables than unused scrapers (Table 8-3). In order to be listed as a significant variable for each social group, ninety percent of the comparisons had to be significant.

The most difficult type of style to identify is individual style, because the attributes used to define it are not consistent for each individual. For example, I can not say that breath/length or any other measurement was consistently different between all the individuals studied. Unfortunately, there is overlap between the attributes for discerning functionally different unused and used-up scrapers and those used for differentiating social groups. Hence, context is exceptionally important when trying to discern the meanings behind stone tool variation.

Table 8-2: Comparison of significant lithic attributes associated with functional differences (**o** = no significant difference, **+** = a significant difference, and **-** = attribute not compared).

Attribute	Unused Vs Used-up Scrapers	Raw Material Unused Scrapers	Raw Material Used-up Scrapers	Chopping vs. Scraping All used-up	Type of Hide All used-up
Breadth	**o**	**o**	**o**	**o**	**-**
Length	**o**	**+**	**o**	**o**	**o**
Proximal Thickness	**o**	**+**	**o**	**o**	**-**
Distal Thickness	**+**	**o**	**o**	**+**	**+**
Breadth/ Length	**+**	**+**	**o**	**o**	**o**
Distal Thickness/ Length	**+**	**o**	**o**	**+**	**o**
Weight	**o**	**o**	**o**	**o**	**o**
Retouch Length	**+**	**o**	**o**	**+**	**+**
Edge Angle	**+**	**o**	**o**	**o**	**o**
Dorsal Scar	**o**	**-**	**-**	**-**	**o**
Cross-section	**+**	**-**	**-**	**-**	**o**
Planform	**o**	**-**	**-**	**-**	**o**
Platform Types	**o**	**-**	**-**	**-**	**o**
Cortex	**o**	**-**	**-**	**-**	**-**

Table 8-3: Important unused scraper attributes associated with social group membership (**o** = no significant difference, **+** = a significant difference, and - = attribute not compared). A significant difference is assigned if 90 percent of the comparison were significant.

Attribute	Subreigions *Zucano* vs. *Tutuma*	Political districts	Moiety	Clan	Lineage	Learning Groups	Individual	Age/ Experience	Handedness
Raw material	-	-	-	-	+	-	-	-	-
Breadth	o	o	+	o	+	o	o	o	-
Length	+	+	+	+	+	o	o	o	-
Proximal Thickness	+	+	+	o	+	o	o	o	-
Distal Thickness	+	+	+	+	+	+	o	o	-
Breadth/ Length	+	+	+	+	+	+	o	o	-
Distal Thickness /Length	+	+	+	+	+	+	o	o	-
Weight	o	-	-	-	-	-	o	o	-
Retouch Length	+	+	o	+	+	+	o	o	-
Edge Angle	o	-	-	-	+	o	o	o	-
Dorsal Scar	+	o	-	-	-	-	-	o	-
Cross-section	+	o	-	-	-	-	-	o	-
Planform	+	o	-	-	-	-	-	o	-
Platform Types	+	o	-	-	-	-	-	o	-
Spurs	+	-	-	-	-	-		+	-
Breakage	+	-	-	-	-	-		+	-
Cortex Location	o	-	-	-	-	-		-	o

Table 8-4: Important used-up scraper attributes associated with social group membership (**o** = no significant difference, **+** = a significant difference, and - = attribute not compared). A significant difference is assigned if 90 percent of the comparison were significant.

Attribute	Subreigions *Zucano* vs. *Tutuma*	Political districts	Moiety	Clan	Lineage	Learning Groups	Individual	Age/ Experience	Handedness
Raw material	-	-	-	-	+	-	-	-	-
Breadth	+	o	+	o	+	o	o	o	-
Length	+	o	+	o	+	o	o	o	-
Proximal Thickness	+	o	+	o	+	o	o	o	-
Distal Thickness	+	+	+	+	+	+	o	o	-
Breadth/ Length	+	+	+	+	+	+	o	o	-
Distal Thickness /Length	+	+	o	+	+	+	o	o	-
Weight	o	-	-	o	-	-	-	-	-
Retouch Length	+	+	-	o	+	+	o	o	-
Edge Angle	o	-	-	o	-	+	o	o	-
Dorsal Scar	-	o	-	-	o	o	-	-	-
Cross-section	-	o	-	-	o	o	-	o	-
Planform	-	o	-	-	o	o	-	o	-
Platform Types	-	o	-	-	o	o	-	o	-
Spurs	-	-	-	-	-	-	-	+	-
Breakage	-	-	-	-	-	-	-	+	-
Cortex Location	-	-	-	-	-	-	-	-	o

Future Directions in Lithic Ethnoarchaeology

This is the first long-term study of stone tools with hide-workers in southern Ethiopia. Currently, we know of at least nine other ethnic groups (Amarro, Dizi, Gurage, Hadiya, Konso, Oyda, Sidama, and Wolayta), who use stone tools for scraping hides in southern Ethiopia (Brandt 1996; Brandt et al. 1996). A comprehensive survey still needs to be conducted to determine if ethnic groups farther to the west and southwest use stone. It is my hope that future research will be conducted among the Gamo and other stone tool using ethnic groups to reveal a more intricate understanding of the style and function debate as discussed above, as well as craft specialization, gender, and site formation processes.

Craft Specialization

Hayden (1990) proposed a model to explain the importance of hide-working in the evolution of complex societies. He argues that simple hunting/gathering societies have little social need for skin clothes, and their tools display generalized morphologies on locally available raw materials. In complex hunting/gathering societies, garments become status-display items resulting in the use of morphologically specialized hide-working tools made on carefully selected raw materials. Hide-workers would be selected specifically for the quality of their work, leading eventually to craft specialization and standardization in form.

A study of Ethiopian hide-workers can contribute to the archaeological testing of Hayden's model by providing relevant social/economic data from a systematic context. Such data can be combined with archaeological indicators of complexity and

craft specialization to form a model. They can be tested not just on hunter-gatherer sites, but at such chiefdom/state-level sites such as Aksum in northern Ethiopia, where the appearance of large quantities of end scrapers in restricted areas correspond to increasing evidence for political complexity (Michaels 1991:69). Future studies of hide-working societies in association with the excavation of historic and prehistoric sites may offer a wider array of explanations for the development of and the time depth of craft specialization associated with stone tools in southern Ethiopia.

Gender

Ethnohistory and ethnography have documented women making and using stone tools (Bird 1993; Goodale 1971; Gould 1977:166; Hamilton 1980; Hayden 1977:183-186; Holmes 1919:316; Tindale 1965:246). Yet, women identified as tool-makers are often masked over by themes of man the hunter and the tool-maker (Conkey and Spector 1984; Gero 1991; Nelson 1997:95-98; Zihlman 1997). The role of gender in the past as an organizing feature of society has been the focus of few articles concerning lithic technology (Casey 1998; Gero 1991; Kehoe 1990; Mazel 1989; Sassaman 1992; Wadley 1989). Although avenues are opening for exploring the relationships between gender and space (Conkey 1991; Kent 1998), division of labor (Gero 1991; Wright 1996), and power (Nelson 1997; Spector 1991). Other archaeological studies of stone tools have suggested that variation in terms of expedient tools and formally shaped tools represent differences in the gender of the maker in archaeological studies in South America (Gero 1991), North America (Sassaman 1992, 1997), and West Africa (Casey 1998).

Although all previous studies of Ethiopian hide-workers have shown them to be exclusively male, it is clear from our brief reconnaissance in 1995 (Brandt 1996; Brandt et al. 1996) that women also are independently manufacturing and using flaked stone tools for hide-working among the Wolayta and Konso. This has tremendous implications for studying the role of women as stone tool-makers and users, both from systemic and archaeological contexts (Conkey and Spector 1984; Gero 1991). If gender differences in Konso society account for the variability witnessed in the synchronic appearance of stone tools that are functionally similar, then there should be a statistically significant difference between the scrapers of men and women, who use the same material and learned stone tool production and use from the same individual. If procurement is a gendered activity, then we may expect that men and women may produce slightly different tools. Men and women also may have access to different types of quarries due to their patrilineage and/or other household responsibilities. If one sex is dependent on the other to procure the raw material, then the former may produce scrapers that are more highly curated than the latter because of lack of access to the material. Furthermore, since hide-working is a part-time activity, then we may find that stone tools are manufactured and used in different areas and in different proportions for men and women, who are otherwise engaged in gender specific activities.

Archaeological Formation Processes

The largest class of artifacts in the archaeological record is comprised of stone and as such our search for understanding human behavior and explanations of cultural

processes should be expanded to include the processes by which stone artifacts are produced, distributed, used, and discarded (Crabtree 1982). The basic model that most archaeologists have followed concerning the life cycle (procurement, use, recycling, discard, etc.) of material culture and their subsequential effect on the archaeological record is based on Schiffer's (1972, 1982) flow charts. Archaeologists tend to view an assemblage as a single coherent event, as a "Pompeii premise," rather than familiarizing themselves with cultural site formation processes (Schiffer 1972, 1982). Hayden (1990) and Hayden, Franco, and Spafford (1996) argued that procurement, production, use, and reuse specifically affect stone tool formation processes and hence tool morphology. Torrence (1986:61-66) has effectively demonstrated how data from the previous studies of Ethiopian hide-workers can provide important insights into reconstructing prehistoric systems of production in terms of personal use, exchange, division of labor, and craft specialization. However, she states repeatedly the need for further studies of the hide-workers and a larger sample size before one can discriminate between these competing hypotheses (Torrence 1986:66).

Procurement

The cultural and economic factors that influence the decision to use a particular raw material for a tool are not well known (Nelson 1991; Runnels 1985). In addition, despite the high level of interest (Becker 1959; Ericson 1984; Hayden and Nelson 1981; Jeske 1989; Shafer and Hester 1983) there have been few attempts to systematically analyze quarrying locations (Singer 1984; Torrence 1986). Several questions concerning lithic procurement and quarry analysis beckon further research such as organization of ownership, rate of production, reduction technology, social

distance (between materials, knapper, and user), labor, quantity of material rejected, spatial layout, and techniques of extraction (pits, vertical shafts, horizontal tunnels, hammer-stones, thermal removal). Furthermore, researchers have traditionally contrasted the direct access of resources by mobile people resulting in the curation of stone tools and the production of more formal tools, with an indirect procurement by sedentary peoples resulting in informal tools (Henry 1989; Parry and Kelley 1987). The Ethiopian hide-workers use an array of raw material types including obsidian, bottle glass, chert, and quartz for producing scrapers. They also exhibit a diaspora of procurement strategies: direct access to natural outcrops; long distance recycling of stone age artifacts; and bartering/trading with a middle person, thus opening up many avenues for future research concerning procurement, resource distance and quality and social relations.

Manufacture

The reduction of raw material to the finished tool form requires not only several stages of manufacture, which may include direct percussion, indirect percussion, bipolar, and pressure flaking, but also correspondingly several different kinds of fabricators that must be of material different from the stone being worked (Crabtree 1982). Within the unifunctional domain of Ethiopian hide-working, there is a surprising amount of variability observed in methods of flaking (bipolar, direct percussion), fabricators (iron bar, iron ax, stone), debris receptacles (skins, basketry, broken pottery fragments, wood bowls), degree of expediency in manufacturing, and division of labor, to mention only a few variables. Furthermore, some groups produce

formal scrapers (Sidama, Gurage, northern Gamo, and Wolayta), while others produce more informal scrapers (Konso and southern Gamo).

Use, recycling, and maintenance

Ethnographic study of stone tool manufacture provides a living laboratory from which to observe usewear and the associated behavioral patterns. There is great potential for conducting: 1) comprehensive microwear and residue (including DNA) analysis of the end scrapers (Brink 1978:94-113; Clark and Kurashina 1981; Hardy 1996; Hayden 1979:125-131, 1990; Shea 1987; Siegal 1984; Smith and Toth 1990), and 2) studies on the uselife of the scrapers, mastics, and handles (Bamforth 1986; Clark and Kurashina 1981; Dibble 1987; Gallagher 1977a, 1977b:214-330; Kuhn 1990). The observation and recording of the life cycle of the hide-worker's scrapers in juxtaposition to variation in behavior such as: left handedness verses right handedness, differences in socket size and type of hide, the angle at which the hide is bolstered, the number of times resharpened and the fabricator used, the direction hide is scraped (to name a few) offer keys to unlocking the microwear analysis of a functionally uniform tool type.

Storage and discard

The ethnographic disbursement of materials is interesting both in terms of analyzing the specialized use of space and the formation of the archaeological record (Kent 1987). The focus on spatial artifact patterning has also been a source for understanding past ideology and symbolic structures (Leone 1984; Donley-Reid 1990). Ethiopian hide-working practices concerning the methods and location of lithic disposal vary greatly from: 1) primary refuse inside specialized workshops; 2)

secondary refuse so that lithic materials are first collected and stored in a container and then discarded away from their primary place of use or removal; and 3) defacto refuse or the accidental discard of lithics. In addition, hide-workers have a wide variety of locations where they deposit their lithic materials including: inside the compound, outside the compound, along fences, in fields, in hearths, in rodent or other natural holes, in human-made holes or ditches, which lends itself to a wide range of studies relating to social organization and site structure.

Several studies have also examined the affects of trampling on stone tools after their discard to determine the rate of dispersal, breakage, and edge damage to the tools (Gifford-Gonzales et al. 1985). Some studies suggest that the effects of trampling only randomly damage the edge and would not be confused with use-damage (Tringham et al. 1974:192). Others state that patterned edge damage occurs on obsidian and flint artifacts submitted to trampling (Flenniken and Haggarty 1979; McBrearty et al. 1998). Longitudinal studies of ethnographic stone tool discard piles should be able to provide us with further insights concerning postdepositional dispersal and edge damage.

In southern Ethiopia, we know of many other ethnic groups, who still use stone tools and, possibly, many more have yet to be identified. There are a large number of issues to be explored connecting people to their stone tools including social and economic organization, gender, site formation, hafting, procurement, manufacture, use, recycling, and discard. Thus, there is enormous potential for future research answering archaeological questions pertaining to lithic technology.

Conclusion

Ethnoarchaeology is a valuable tool for drawing out the meanings behind stone tool variation. This study of the Gamo hide-working materials and practices importantly outlined how variation in stone tool morphology exposes the heterogeneous nature of culture incorporating both functional and stylistic aspects within a single culture. To understand stone tool morphological differences in terms of style or function, the archaeologist needs to enlist a methodology based on scales of analysis. This requires a vast knowledge concerning the environmental resources and the cultural remains on a multicontextual scale including regional, subregional/intersite, site, and local/intrasite levels. This could easily span the career of a single researcher if not several generations of researchers. I hope that future archaeologists and ethnoarchaeologists will test this model concerning social group membership, space, and scraper morphology to determine its applicability in other societies.

APPENDIX A
KINSHIP CHARTS

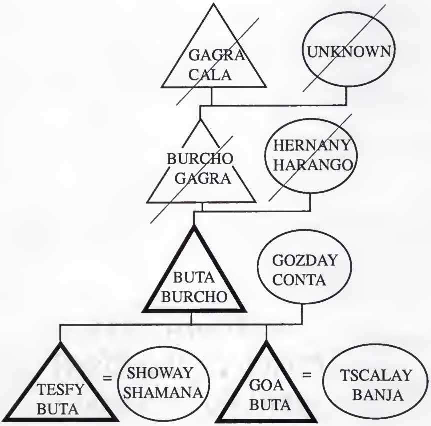


Figure A-1: Diagram of Mogesa kinship relationships of Buta, Tesfy, and Goa. The darker triangles represent living hide-workers, who I studied.

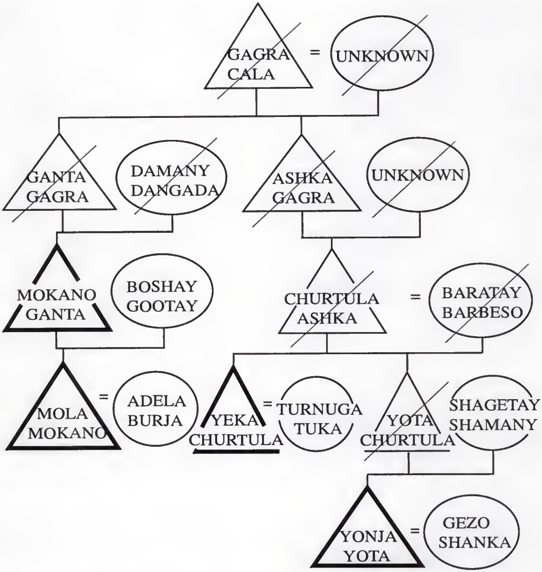


Figure A-2: Diagram of Mogesa kinship relationships of Mokano, Mola, Yeka, and Yonja. The darker triangles represent living hide-workers, who I studied.

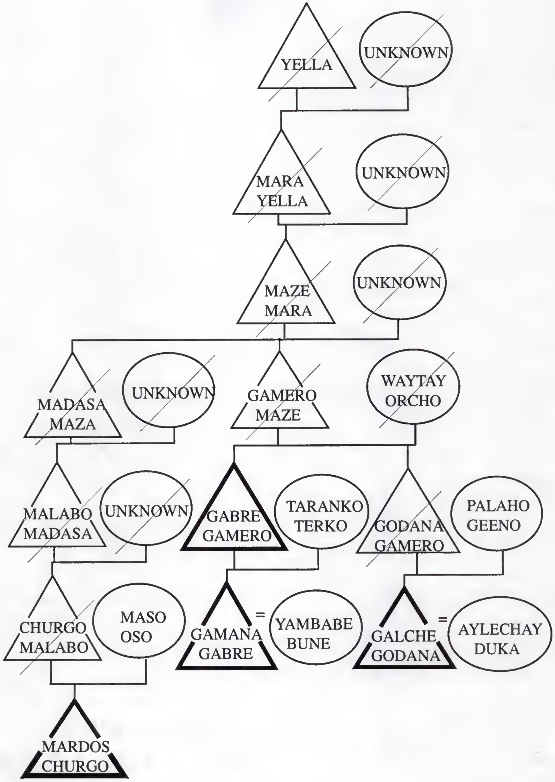


Figure A-3: Diagram of Amure kinship relationships of Gabre, Gamana, Galche, and Mardos. The darker triangles represent living hide-workers, who I studied.

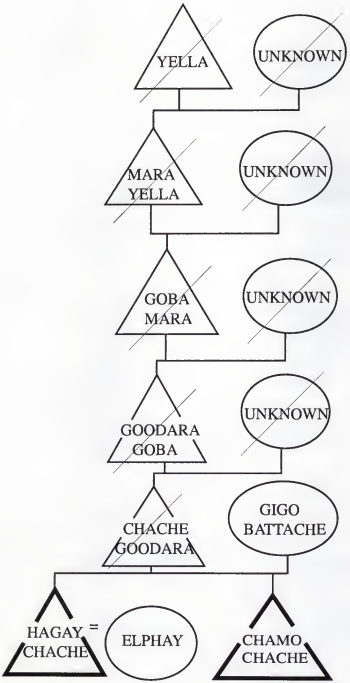


Figure A-4: Diagram of Amure kinship relationships of Chamo and Hagay. The darker triangles represent living hide-workers, who I studied.

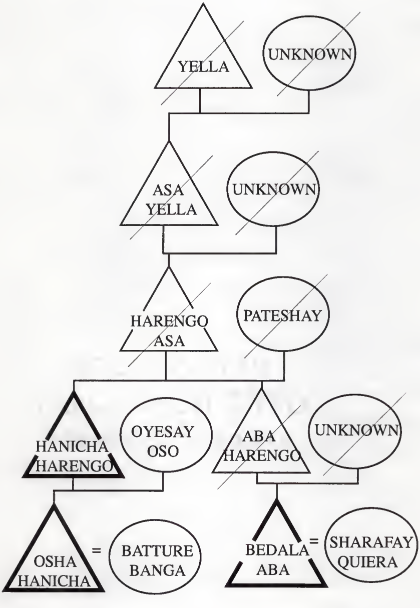


Figure A-5: Diagram of Amure kinship relationships of Hanicha, Osha, and Bedala. The darker triangles represent living hide-workers, who I studied.

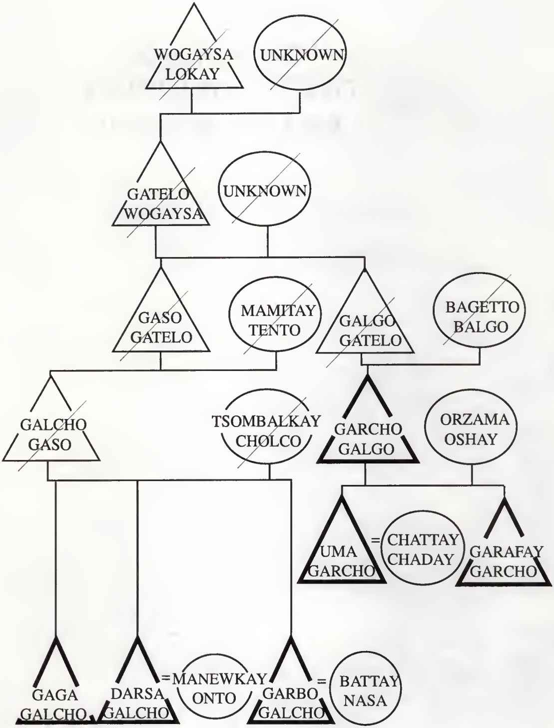


Figure A-6: Diagram of Patela kinship relationships of Gaga, Darsa, Garbo, Garcho, Uma, and Garafay. The darker triangles represent living hide-workers, who I studied.

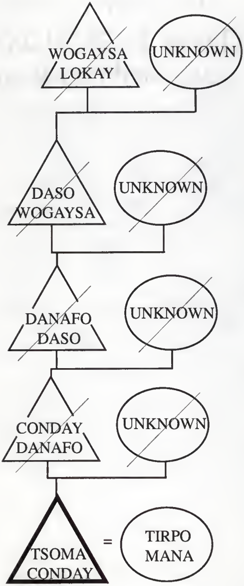


Figure A-7: Diagram of Patela kinship relationships of Tsoma. The darker triangles represent living hide-worker, who I studied.

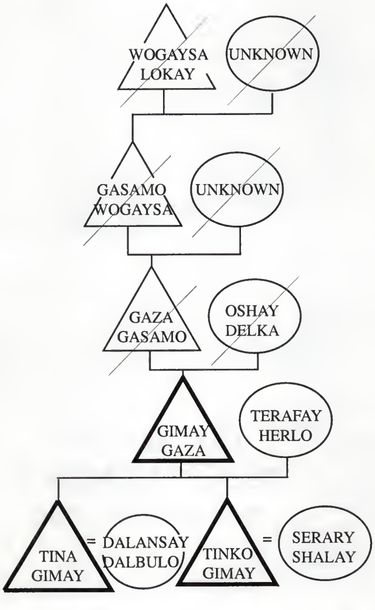


Figure A-8: Diagram of Patela kinship relationships of Gimay, Tina, and Tinko. The darker triangles represent living hide-workers, who I studied.

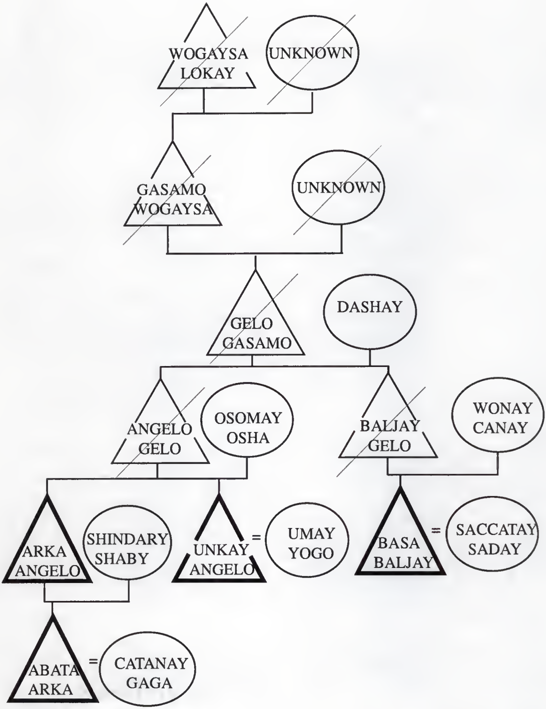


Figure A-9: Diagram of Patela kinship relationships of Arka, Abata, Unkay, and Basa. The darker triangles represent living hide-workers, who I studied.

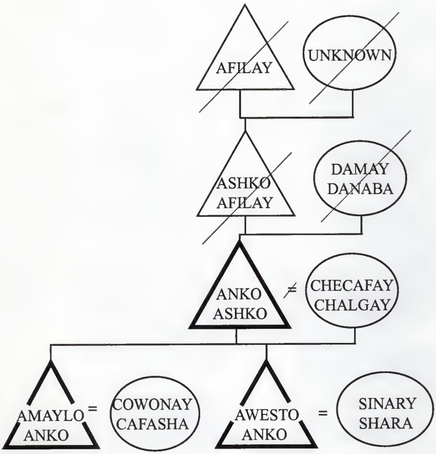


Figure A-10: Diagram of Eeyahoo kinship relationships of Amaylo, Awesto, and Anko. The darker triangles represent living hide-workers, who I studied.

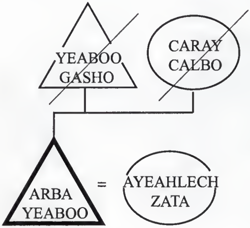


Figure A-11: Diagram of Eeyahoo kinship relationships of Arba. The darker triangles represent living hide-workers, who I studied.

APPENDIX B
ETHNOGRAPHIC DATA

Table B-1: The number of villages in each *dere* with members belonging to each clan and moiety.

Moiety	**Clan Name**	**Borada**	**Ochollo**	**Doko**	**Dorze**	**Kogo**	**Zada**
Dogala	Amara	3	1			4	6
Dogala	Bola			10	2	11	1
Dogala	Bolosa					3	
Dogala	Damota	3	1		1	6	
Dogala	Dokama					1	
Dogala	Dogala	2					
Dogala	Gadda	1					
Dogala	Goodara	1				5	
Dogala	Gorana				1		
Dogala	Manga						
Dogala	Maagata	5			1		
Dogala	Maka	1		4	1	1	
Dogala	Masha			3		9	1
Dogala	Wogela					1	
Dogala	Zamanay					2	
Dogala	Zutuma	8			5	12	7
DOGALA	**Total**	**24**	**2**	**17**	**11**	**67**	**15**
Mala	Boradamala	4				3	
Mala	Gezemala	7	1	1	4	20	12
Mala	Gowmala			4	1	2	
Mala	Dalomala					1	3
Mala	Diamala					1	
Mala	Ushkalmala			1			
Mala	Washomala			1			
MALA	**TOTAL**	**11**	**1**	**8**	**5**	**27**	**15**

Table B-2: Hide-workers marriage patterns, differences between wife's and mother's clan name and village. Figure 3-3 for locations of villages/subdistricts.

Name	Clan	Wife's Clan	Mother's clan	Wife's village and subdistrict	Mother's Village and subdistrict
Hanicha	Maagata	Masha	?	Leesha Guyla	?
Bedala	Maagata	Boradamala	?	Ezo Gulay Tzabo	?
Okoto	Maagata	Gezemala	Masha	Kuche	Leesha Guyla
Osha	Maagata	Boradamala	Masha	Borada	Leesha Guyla
Gabre	Maagata	Zutuma	Amare	Chileshe Shara	Meesheda Guyesa
Gamana	Maagata	Zutuma	Zutuma	Kucha	Chileshe Shara
Galche	Maagata	Zutuma	?	Leesha Guyla	Birbir
Mardos	Maagata	x	Masha	x	Leesha Guyla
Chamo	Maagata	x	Gezemala	x	Leesha Mesa
Hagay	Maagata	Zutuma	Gezemala	Ezo Kogo	Leesha Mesa
Buta	Gezemala	Maka	Maagata	Moraday	Chileshe Dembe
Tesfy	Gezemala	Zutuma	Maka	Birbir	Moraday
Goa	Gezemala	Maagata	Maka	Moraday	Moraday
Mokono	Gezemala	Maagata	Gezemala	Moraday	Moraday
Mola	Gezemala	Zutuma	Maagata	Birbir	Moraday
Yota	Gezemala	Zutuma	Gowmala	Birbir	Barena Waya
Yeka	Gezemala	Gezemala	Gowmala	Barena Waya	Barena Waya
Yonja	Gezemala	Amare	Zutuma	Mulato Pitay	Birbir

Table B-2 continued.

Arba	Gezemala	Gezemala		Ezo Zita	Eeyahoo Shongalay
Amaylo	Bolosa	Gezemala	Gezemala	Zala Barena	Ezo Shasha
Awesto	Bolosa	Goodara	Gezemala	Zala Barena	Ezo Shasha
Gimay	Zutuma	Dalomalo	?	Ezo Olay	Tsela Ochollo
Tina	Zutuma	Gezemala	Dalomalo	Ezo Tula	Ezo Olay
Tinko	Zutuma	Gezemala	Dalomalo	Ezo Shasha	Ezo Olay
Unkay	Zutuma	Gezemala	Gezemala	Ezo	Tsela Ochollo
Arka	Zutuma	Gezemala	Gezemala	Ezo Shasha	Tsela Ochollo
Abata	Zutuma	Amara	Gezemala	Ezo Olay	Ezo Shasha
Basa	Zutuma	x	Gezemala	x	Kucha
Garcho	Zutuma	Gezemala	Gezemala	?	Leesha Meesheda
Garafay	Zutuma	x	Gezemala	x	Tsela Ochollo
Uma	Zutuma	Gezemala	Gezemala	Ezo	Tsela Ochollo
Gaga	Zutuma	x	Gezemala	x	Ezo Tula
Garbo	Zutuma	Gezemala	Gezemala	Dita	Ezo Tula

Table B-3: Listing of the northern Gamo *tutuma*-users and the name of the subdistrict and district from which they originated.

Name (No. of handles)	**Living in**	**From**	**Father From**
Tsara Tsada (burned in fire)	Barena Zala	Kogo-Ezo Kogo Central region	-
Kosha Quira (1)	Barena Zala	Kogo-Ezo Gulay Central region	-
Delasa Deedano (1)	Barena Zala	Kogo-Ezo Tula Central region	-
Hamalay Haro (none)	Barena Zala	Doko-Doko Zolo Central region	-
Arba Yeaboo (2)	Shongalay	Kogo-Ezo Gulay Central region	-
Amaylo Anko (2)	Shongalay	Kogo-Ezo Waro Central region	-
Awesto Anko (1)	Shongalay	Kogo-Ezo Waro Central region	-
Etolo Balgo (none)	Shongalay	Zada-Leesha Central region	-
Yazah Bodeetay (1)	Barena Waya	Borada-Barena Waya	Doko Central region
Milkana Hare (2)	Chileshe Alo	Borada-Chileshe Alo	?
Meecha Chama (1)	Goocho Doobana	Borada-Goocho Doobana	Chileshe Borada?

Table B-4: Listing of the elder Central Gamo hide-workers, who still own *zucano* handles.

Individual	**Residence**	**Number of *Zucano* handles**
Heraba Haylo	Ezo Olay Kogo	1 (not measured)
Tsada Chalgay	Ezo Shasha Kogo	1
Somany Soto	Ezo Otay Kogo	3
Masgay Wachay	Tsula Saytay Kogo	1

Table B-5: Listing of the Central Gamo *zucano*-users and their relationship to individuals from the northern Gamo region, from whom they obtain their handle resources.

Name	**Living in**	**Wife From**	**Other**
Boundesa Burka	Delbensa Kasha	Cortcha Cheri's sister	
Dunga Dumase	Leesha Guyla		Mother from Ochollo
Battcho Balgo	Leesha Meza		Gets from Banja
Bayene Bache	Leesha Meza		Gets from Banja
Corcha Cheri	Leesha Boudela		Gets from Curay
Curay Duka	Leesha Boudela	Mulato Zefene	
Banja Battay	Leesha Boudela	From Ochollo	

Table B-6: Listing of hide-workers from the highland areas, who married women from lowland region, as it influences handle type.

Name & Handle	Location	Wife From	Father-in-laws occupation
Goa Buta *zucano*	Shongalay Mogesa	Moraday	Hide-worker
Mokano Ganta *zucano*	Shongalay Mogesa	Moraday	Hide-worker
Yeka Churtulo *zucano*	Shongalay Mogesa	Moraday	Hide-worker
Yonja Yota *zucano*	Shongalay Mogesa	Mulato Pitay	Hide-worker
Mudela Mugge *tutuma*	Dorze Hirpo	Ochollo Chanco	Fa died, brothers make chairs no scraping
Gerche Gootay *tutuma*	Dorze Hirpo	Ochollo Dencare	Fa died, brothers make chairs no scraping
Ara Arayno *tutuma*	Tsula Saytay	Gema	Grindstone maker
Tojary Tolo *tutuma*	Tsula Mafuna-zolo	Uma Lante	Grindstone maker
Dozay Quira *tutuma*	Ezo Gulay Tzabo	Chileshe Dembe Amure	Iron worker
Wombaro Salo *tutuma*	Doko Mesho	Ergesa Wozo	moved from Mangesa Iramo
Circa Shalfa *tutuma*	Ezo Shasha	Barena Waya	Father Bodeteey uses *tutuma* from Doko
Otollo Delbicha *tutuma*	Ergesa Isanda	Kucha	unknown

Table B-7: Comparison of the different Gamo clans and the number of unused scrapers in my assemblage from each village.

Village (handle type)	**Maagata (n=245)**	**Damota (n=72)**	**Gezemala (n=249)**	**Zutuma (n=296)**	**Bolosa (n=66)**
Amure (*zucano*)	243	0	0	0	0
Afilaketsa (*zucano*)	0	39	0	0	0
Dubana (*zucano*)	0	0	0	1	0
Daroba (*zucano*)	1	0	0	0	0
Kolba (*zucano*)	0	0	0	1	0
Tsaday (*zucano*)	0	0	0	1	0
Gagolay (*zucano*)	0	0	1	0	0
Mogesa (*zucano*)	0	0	214	0	0
Zefene (*zucano*)	0	0	1	0	0
Zagay (*zucano*)	0	1	0	0	0
Eeyahoo (*tutuma*)	0	0	33	0	45
Saytay (*tutuma*)	0	0	0	1	0
Kodo (*tutuma*)	0	0	0	0	19
Pango (*tutuma*)	0	32	0	0	0
Patala (*tutuma*)	0	0	0	292	0
Dubana (*tutuma*)	1	0	0	0	0

Table B-8: Comparison of the different Gamo clans and the number of used-up scrapers from each lineages/villages.

Village (Handle Type)	**Maagata (n=218)**	**Damota (n= 53)**	**Gezemala (n= 352)**	**Zutuma (n=239)**	**Bolosa (n=142)**
Amure (*zucano*)	216	0	0	0	0
Afilaketsa (*zucano*)	0	25	0	0	0
Dubana (*zucano*)	1	0	0	5	0
Daroba (*zucano*)	1	0	0	0	0
Tsaday (*zucano*)	0	0	0	2	0
Gagolay (*zucano*)	0	0	1	0	0
Mogesa (*zucano*)	0	0	286	0	0
Zefene (*zucano*)	0	0	1	0	0
Zagay (*zucano*)	0	3	0	0	0
Cancho (*zucano*)	0	0	1	0	0
Mandita (*zucano*)	0	0	0	5	0
Eeyahoo (*tutuma*)	0	0	55	0	134
Saytay (*tutuma*)	0	0	0	2	0
Kodo (*tutuma*)	0	0	0	3	8
Pango (*tutuma*)	0	23	0	0	0
Patela (*tutuma*)	0	0	0	217	0
Goydana (*tutuma*)	0	2	0	0	0
Shama (*tutuma*)	0	0	1	0	0
Telo (*tutuma*)	0	0	3	0	0
Hadara (*tutuma*)	0	0	1	0	0
Lyo (*tutuma*)	0	0	3	0	0
Borchay (*tutuma*)	0	0	0	5	0

APPENDIX C
STATISTICS AND HANDLE AND SCRAPER DATA

T-test (the letters in column 2 refer to the letters in column 1)

B	Observation 1
C	Observation 2
D	Variance 1
E	Variance 2
F	Mean1
G	Mean2
H	B-1xDxD
I	C-1xEXE
J	H+I
K	B+C-2
L	J/K
M	Square root L
N	F-G
O	SQRT (1/B+1/C)
P	MxO
Q	N/P
R	B2+C2-2 Confidence level at 0.05

Chi-square Test
(observed-expected) (observed-expected) ÷ expected
Confidence level at 0.05

Analysis of Co-variance--Standard Deviation Comparisons
Standard deviation÷ Mean x 100

Table C-1: Comparison of unused and used-up scrapers mean measurements and t-test results (bolded cells are significant at the 0.05 confidence level).

Mean Measurement in centimeters	Unused n= 811 (variance)	Used-up n= 872 (variance)	T-test Results T-critical =1.96
Medial Breadth	2.4 (0.26)	2.4 (0.18)	1.8
Maximum Length	**3.4 (0.8)**	**2.76 (0.39)**	**21.4**
Proximal Thickness	1.1 (0.16)	1.1 (0.1)	0
Distal Thickness	0.4 (0.09)	0.85 (0.02)	**159.34**
Breadth/Length Ratio	0.7 (0.04)	0.9 (0.04)	**81.99**
DThickness/Lengthe ngth Ratio	0.1 (0)	0.32 (0.02)	**299.01**
Weight	11 (44.5)	8.6 (18.98)	1.2
Retouch Length	0.2 (0.03)	0.94 (0.11)	**175.22**
Distal Edge Angle	50 (11.74)	67.21 (159.9)	**2.47**

Table C-2: Chert and obsidian unused scrapers mean measurements and t-test results (bolded cells are significant at the 0.05 confidence level).

Mean Measurements in centimeters	Chert n = 778 (variance)	Obsidian n= 62 (variance)	T-test Results T-critical =1.96
Medial Breadth	2.43 (0.25)	2.36 (0.36)	1.74
Maximum Length	**3.05 (0.61)**	**3.44 (0.8)**	**3.84**
Proximal Thickness	**1.14 (0.16)**	**1 (0.14)**	**6.68**
Distal Thickness	0.35 (0.02)	0.35 (0.03)	0
Breadth/Length Ratio	**0.74 (0.04)**	**0.8 (0.05)**	**11.11**
DT/Length Ratio	0.11 (0)	0.11 (0)	0
Weight	10.8 (45)	7.7 (25)	0.5
Retouch Length	0.24 (0.04)	0.23 (0.03)	1.92
Distal Edge Angle	50.6 (111)	48.63 (113)	0.13

Table C-3: Chert and obsidian used-up scrapers mean measurements and t-test results (bolded cells are significant at the 0.05 confidence level).

Mean Measurements in centimeters	**Chert n= 778 (variance)**	**Obsidian n=88 (variance)**	**T-test Results T-critical =1.96**
Medial Breadth	2.4 (0.18)	2.4 (0.18)	0
Maximum Length	2.76 (0.39)	2.76 (0.37)	0
Proximal Thickness	1.1 (0.1)	1.1 (0.11)	0
Distal Thickness	0.86 (0.09)	0.84 (0.11)	1.92
Breadth/Length Ratio	0.89 (0.44)	0.93 (0.05)	0.8
DT/Length Ratio	0.32 (0.02)	0.32 (0.02)	0
Weight	8.68 (19)	7.9 (12.1)	0.36
Retouch Length	0.94 (0.12)	0.95 (0.13)	0.73
Distal Edge Angle	67 (160)	67 (158)	0

Table C-4: Used-up scrapers for scraping verses chopping comparison of mean measurements and t-test results (bolded cells are significant at the 0.05 confidence level).

Mean Measurements in centimeters	**Scrape Only n= 30 (variance)**	**Scrape & Chop n= 64 (variance)**	**T-test Results T-critical =2.00**
Medial Breadth	2.43 (0.12)	2.4 (0.13)	1.06
Maximum Length	2.7 (0.34)	2.64 (0.23)	1.67
Proximal Thickness	1.1 (0.09)	1.1 (0.09)	0
Distal Thickness	**0.8 (0.06)**	**0.87 (0.08)**	**4.25**
Breadth/Length Ratio	**0.93 (0.04)**	**1 (0.05)**	**2.08**
Distal Thickness /Length Ratio	**0.3 (0.01)**	**0.34 (0.02)**	**10.34**
Weight	9 (17.8)	8.11 (10.89)	0.30
Retouch Length	**0.8 (0.08)**	**0.95 (0.09)**	**5.71**
Distal Edge Angle	66 (143.8)	63.6 (66)	0.1

Table C-5: Comparison of highland and lowland hides (bolded cells are significant at the 0.05 confidence level.

Measurement	**Highland Mean mm (variance)**	**Lowland Mean mm (variance)**	**T-Test Results T-critical 2.056**
Width	140.5 (826)	131.8 (76.6)	0.3
Length	174.17 (391)	168.4 (230)	0.4
Thickness	2.7 (0.19)	3.96 (0.92)	**5.2**

Table C-6: Used-up scrapers for lowland and highland hides mean measurement and t-test results (bolded cells are significant at the 0.05 confidence level).

Mean Measurement in centimeters	**Lowland n= 57 (variance)**	**Highland n= 54 (variance)**	**T-test Results T-critical =1.96**
Breadth	2.4 (0.8)	2.5 (0.14)	**4.65**
Maximum Length	2.68 (0.33)	2.74 (0.21)	1.13
Distal Thickness	**0.95 (0.07)**	**0.8 (0.09)**	**9.17**
Proximal Thickness	1.13(0.08)	1.06(0.08)	0
DT/Length Ratio	0.3 (0.02)	0.3 (0.01)	0
Weight	8.73 (11.7)	8.6 (13.5)	0.07
Retouch Length	**1 (0.08)**	**0.9 (0.11)**	**5.4**
Distal Edge Angle	65.9 (0.9)	63.5 (166)	0.08

Table C-7: Unused scrapers hafted in*zucano* and*tutuma* handles comparison of mean measurement and t-test results (bolded cells are significant at the 0.05 confidence level).

Mean Measurement in centimeters	***Zucano* n= 476 (variance)**	***Tutuma* n=466 (variance)**	**T-test Results T-critical = 2.00**
Medial Breadth	2.53 (0.17)	2.52 (0.62)	0.34
Maximum Length	3.93 (0.47)	3.04 (0.89)	**19.23**
Proximal Thickness	1.25 (0.11)	1.04 (0.18)	**21.66**
Distal Thickness	0.39 (0.02)	2.32 (0.55)	**76.51**
Breadth/Length Ratio	0.66 (0.12)	0.86 (0.07)	**31.75**
DThickness/Length ength Ratio	0.1 (0)	0.12 (0)	**25.36**
Weight	13.27 (34.4)	10.06 (105.34)	0.63
Retouch Length	0.31 (0.03)	0.18 (0.04)	**56.51**
Distal Edge Angle	52.01 (91.17)	49.29 (143.01)	0.34

Table C-8: Used-up scrapers hafted in*zucano* and *tutuma* handles comparison of mean measurement and t-test results (bolded cells are significant at the 0.05 confidence level).

Mean Measurements in centimeters	***Zucano*** **n= 566 (variance)**	***Tutuma*** **n= 489 (variance)**	**T-test Results T-critical = 2.00**
Medial Breadth	2.45 (0.13)	2.39 (0.25)	**4.98**
Maximum Length	2.89 (0.38)	2.71 (0.49)	**6.47**
Proximal Thickness	1.15 (0.08)	1.08 (0.12)	**11.28**
Distal Thickness	0.92 (0.09)	0.79 (0.1)	**22.22**
Breadth/Length Ratio	0.88 (0.04)	0.92 (0.05)	**11.69**
DThickness/Length ength Ratio	0.33 (0.02)	0.31 (0.02)	**25.36**
Weight	9.36 (16.47)	8.58 (31.5)	0.51
Retouch Length	1 (0.1)	1.16 (0.1)	**25.92**
Distal Edge Angle	67.89 (149)	65.97 (168.34)	0.19

Table C-9: Chi-square test of unused *zucano* and *tutuma* scrapers for dorsal scar patterns.

	Tutuma **Scrapers No.**	***Zucano*** **Scrapers No.**	
Radial	155	348	**503**
Other types	206	100	**306**
	361	**448**	**809**
	Observed	**Expected**	**$(o-e)^2/e$**
	155	224.5	21.5
	206	136.5	35.4
	348	123.5	408.1
	100	169.5	28.5
			493.5
2 degrees of freedom at 0.05 level		Significane at 0.05 is 5.99	
Since 493. 5 is greater than 5.99 than the differences are significant.			

Table C-10: Chi-square test of unused *tutuma* and *zucano* scrapers for planforms.

	***Tutuma* Scraper No.**	***Zucano* Scraper No.**	
Short Quadrilateral	286	207	**493**
Other types	14	240	**254**
	300	**447**	**757**
	Observed	Expected	$(o-e)^2/e$
	155	195.4	8.35
	206	477.6	154.45
	348	104.6	566.38
	100	149.4	16.33
			745.52
2 degrees of freedom at 0.05 level			
significance level at 0.05 is 5.99			
Since 745. 49 is greater than 5.99 than the differences are significant!			

Table C-11: Chi-square test of unused *tutuma* and *zucano* scrapers for cross-sections.

	***Tutuma* Scraper No.**	***Zucano* Scraper No.**	
Lenticular	163	122	**285**
Plano-convex	61	168	**229**
	224	**290**	**514**
	Observed	Expected	$(o-e)^2/e$
	163	124.2	12.12
	122	160.8	9.36
	61	99.2	14.71
	168	129.8	11.24
			47.44
2 degrees of freedom at 0.05 level			
significance level at 0.05 is 5.99			
Since 47.4 is greater than 5.99 than the differences are significant!			

Table C-12: Chi-square test of unused *tutuma* and *zucano* for platform types.

	***Tutuma* Scraper Number**	***Zucano* Scraper Number**	
Absent	288	369	**657**
Other types	77	69	**146**
	365	**438**	**803**
	Observed	Expected	$(o-e)^2/e$
	288	298.6	0.37628935
	369	358.4	0.31350446
	77	66.4	1.69216867
	69	79.6	1.41155779
			3.79352
2 degrees of freedom at0.05 level	Significan level at 0.05 is 5.99		
Since 3.79 is not greater than 5.99 than the differences are NOT significant!			

Table C-13: *Dere* t-test of *zucano* sockets breadth/height ratio (bolded cells are significant at the 0.05 confidence level).

***Dere* Comparisons**	**Mean1 cm (variance)**	**Mean2 cm (variance)**	**T-test Results T-critical = 2.00**
Borada (n=116) & Zada (n=13)	1.31 (0.08)	1.25 (0.04)	**2.91**
Borada (n=116) & Doko (n=3)	1.31 (0.08)	1.47 (0.25)	**3.15**
Borada (n=116) & Kogo (n=10)	1.31 (0.08)	1.28 (0.06)	1.26
Borada (n=116) & Ochollo (n=5)	1.31 (0.08)	1.39 (0.03)	**2.1**
Zada (n=13) & Doko (n=3)	1.25 (0.04)	1.47 (0.25)	**3.29**
Zada (n=13) & Kogo (n=10)	1.25 (0.5)	1.28 (0.06)	1.53
Zada (n=13) & Ochollo (n=3)	1.25 (0.04)	1.39 (0.03)	**6.63**
Doko (n=3) & Kogo (n=10)	1.47 (0.25)	1.28 (0.06)	**2.35**
Doko (n=3) & Ochollo (n=5)	1.47 (0.25)	1.39 (0.03)	0.74
Kogo (n=10) & Ochollo (n=5)	1.25 (0.06)	1.39 (0.03)	**3.75**

Table C-14: *Dere* t-test for *tutuma* sockets breadth/height ratio (bolded cells are significant at the 0.05 confidence level).

Dere **Comparisons**	**Mean1 cm (variance)**	**Mean2 cm (variance)**	**T-test Results T-critical = 2.00**
Borada (n=10) & Zada (n=44)	2.84 (0.59)	4.43 (5.18)	0.96
Borada (n=10) & Doko (n=24)	2.84 (0.59	3.30 (4.50)	0.32
Borada (n=10) & Dorze (n=16)	2.84 (0.59)	4.90 (4.06)	1.58
Borada (n=10) & Kogo (n=52)	2.84 (0.59)	2.97 (1.87)	0.23
Borada (n=10) & Bonke (n=7)	2.84 (0.59)	12.10 (38.82)	0.77
Zada (n=44) & Doko (n=24)	4.43 (5.18)	3.30 (4.50)	0.89
Zada (n=44) & Dorze (n=16)	4.43 (5.18)	4.90 (4.06)	0.33
Zada (n=44) & Kogo (n=52)	4.43 (5.18)	2.97 (1.87)	1.88
Zada (n=44) & Bonke (n=7)	4.43 (5.18)	12.10 (38.82)	1.31
Doko (n=24) & Dorze (n=16)	3.30 (4.50)	4.90 (4.06)	1.14
Doko (n=24) & Kogo (n=52)	3.30 (4.50)	2.97 (1.87)	0.44
Doko (n=24) & Bonke (n=7)	3.30 (4.50)	12.10 (38.82)	1.13
Dorze (n=16) & Kogo (n=52)	4.90 (4.06)	2.97 (1.87)	2.64
Dorze (n=16) & Bonke (n=7)	4.90 (4.06)	12.10 (38.82)	0.76
Kogo (n=52) & Bonke (n=7)	2.97 (1.87)	12.10 (38.82)	1.78

Table C-15: *Dere* mean morphological measurements of unused scrapers.

Dere	**Breadth cm**	**Length cm**	**Proximal Thickness cm**	**Distal Thickness cm**	**Breadth/ Length**	**Thickness/ Length**	**Edge Angle**	**Weight**	**Retouch Length**
Bonke (n=27)	3.47	3.16	1.15	0.26	1.15	0.08	47.7	14.1	0.06
Kogo (n=30)	2.95	4.15	1.11	0.45	0.74	0.12	51.4	28.3	0.33
Dorze (n=31)	3.69	4.66	1.56	0.51	0.82	0.12	46.9	6.6	0.38
Zada (n=292)	2.24	2.7	0.96	0.31	0.85	0.13	52.7	17.7	0.15
Borada *tutuma*(n=82)	2.59	3.16	1.13	0.34	0.87	0.11	55.2	11.1	0.21
Borada *zucano* (n=473)	2.53	3.93	1.25	0.39	0.65	0.10	51.2	13.3	0.31
Ochollo (n=40)	2.67	4.04	1.26	-	0.69	0.36	62.5	13.8	-

Table C-16: *Dere* t-test results for unused scrapers (T-critical is 1.96, bolded cells are significant at the 0.05 confidence level).

Dere	**Breadth**	**Length**	**Proximal Thickness**	**Distal Thickness**	**Breadth/ Length**	**Thickness/ Length**	**Edge Angle**	**Weight**	**Retouch Length**
Bonke (n=27) & Kogo (n=30)	0.92	**6.58**	**26.12**	**12.9**	**10.92**	**26.6**	0.12	0.32	**12.7**
Bonke (n=27) & Zada (n=292)	**14.53**	**5.66**	**29.78**	**12.82**	**21.90**	**29.78**	0.04	1.01	**15.48**
Bonke (n=27) & Dorze (n=31)	**2.63**	**5.13**	**85.94**	**31.39**	**13.92**	**86.93**	0.12	0.05	**27.55**
Bonke (n=27) & Borada T (n=82)	**6.65**	0.01	**51.08**	**19.93**	**10.75**	**51.07**	0.23	0.18	**25.44**
Bonke (n=27) & Ochollo (n=40)	**4.81**	**5.00**	**13.37**	-	**16.75**	**13.37**	0.41	0.02	-
Bonke (n=27) & Borada Z (n=473)	**17.19**	**8.33**	**42.07**	**33.51**	**63.04**	**42.06**	0.23	0.11	**43.12**

Table C-16 continued.

Kogo (n=30) & Zada (n=292)	**18.73**	**19.64**	**6.06**	**29.27**	**4.15**	**6.06**	0.22	1.60	**24.74**
Kogo (n=30) & Dorze (n=31)	**4.22**	1.89	1.70	**3.19**	**8.61**	**1.97**	0.03	0.15	**1.99**
Kogo (n=30) & Borada T (n=82)	**9.26**	**8.56**	**3.55**	**14.71**	**2.97**	**3.5**	0.12	0.63	**11.13**
Kogo (n=30) & Ochollo (n=40)	**6.97**	**2.57**	**12.43**	-	**10.93**	**12.4**	0.36	0.42	-
Kogo (n=30) & Borada Z (n=473)	**23.63**	**7.21**	**37.07**	**20.63**	**48.68**	**37.06**	0.03	1.30	**8.7**
Zada (n=292) & Dorze	**10.80**	**15.77**	**7.99**	**35.06**	**12.25**	**7.98**	0.26	0.54	**29.4**
Zada (n=292) & Borada T (n=82)	**8.02**	**7.65**	**14.11**	**12.0**	**1.96**	**14.11**	0.55	0.82	**16.0**
Zada (n=292) & Ochollo (n=40)	**7.70**	**16.31**	**37.34**	-	**19.20**	**37.33**	0.81	1.39	-
Zada (n=292) & Borada Z (n=473)	**16.00**	**36.74**	72.80	53.7	**81.54**	**72.33**	0.69	2.73	**71.69**
Dorze (n=31) & Borada T (n=82)	**3.94**	**6.21**	1.98	22.55	**7.36**	**1.97**	0.08	0.17	**15.59**
Dorze (n=31) & Ochollo (n=40)	**2.84**	0.50	**12.76**	-	**4.61**	**12.75**	0.27	0.07	-
Dorze (n=31) & Borada Z (n=473)	**11.12**	**2.30**	**42.00**	**15.61**	**28.48**	**42**	0.04	0.27	**3.41**
Borada T (n=82) & Ochollo (n=40)	1.07	**6.17**	**20.95**	-	**10.80**	**20.95**	0.25	0.22	-
Borada T (n=82) & Borada Z (n=473)	**2.26**	**12.73**	**54.67**	**20.9**	**45.32**	**54.66**	0.26	0.42	**27.8**

Table C-17: *Dere* mean morphological measurements for used-up scrapers.

Dere	Breadth cm	Length cm	Proximal Thickness cm	Distal Thickness cm	Breadth/Length	Thickness /Length	Edge Angle	Weight	Retouch Length
Bonke (n=29)	2.58	2.73	1.12	0.97	0.97	0.36	70.8	9.2	1.19
Kogo (n=32)	2.76	3.48	1.24	0.88	0.81	0.26	66.8	15.1	1.00
Zada (n=223)	2.29	2.43	1.04	0.80	0.97	0.34	68.2	6.9	0.86
Dorze (n=24)	2.11	2.56	1.01	0.71	0.83	0.28	63.0	6.5	0.75
Borada *tutuma*(n=187)	2.47	2.97	1.10	0.74	0.87	0.26	62.5	9.8	0.82
Borada *zucano* (n=565)	2.45	2.88	1.15	0.92	0.88	0.33	67.9	9.3	1.01
Ochollo (n=22)	2.45	2.9	1.19	-	0.88	0.42	65.5	8.7	-

Table C-18: *Dere* t-test results for comparison of used-up scrapers (T-critical is 1.96, bolded cells are significant at the 0.05 confidence level).

Deres	**Breadth cm**	**Length cm**	**Proximal Thickness cm**	**Distal Thickness cm**	**Breadth/Length cm**	**Thickness/ Length cm**	**Edge Angle**	**Weight**	**Retouch cm**
Bonke (n=29) & Kogo (n=32)	**3.99**	**9.06**	**5.8**	**3.34**	**23.71**	**41.70**	0.1	0.5	**6.03**
Bonke (n=29) & Zada (n=223)	**8.42**	**4.70**	**4.86**	**8.78**	**4.02**	**5.86**	0.1	0.8	**13.06**
Bonke (n=29) & Dorze (n=24)	**12.54**	**2.29**	**7.27**	**14.77**	**32.33**	**31.82**	0.2	0.8	**17.53**
Bonke (n=29) & Borada T (n=187)	**1.98**	**2.44**	0.62	**11.78**	**13.41**	**41.31**	0.2	0.1	**14.5**
Bonke (n=29) & Ochollo (n=22)	**5.06**	1.96	**2.83**	-	**27.12**	**14.82**	0.1	0.2	-
Bonke (n=29) & Borada Z (n=565)	**5.54**	**2.26**	**2.08**	**2.93**	**14.96**	**11.35**	0.1	0.0	**9.04**
Kogo (n=32) & Zada (n=223)	**12.71**	**16.47**	**11.57**	**4.0**	**20.14**	**23.31**	0.1	1.7	**5.63**
Kogo (n=32) & Dorze (n=24)	11.65	12.46	10.32	6.17	8.86	11.13	0.1	0.7	8.1

Table C-18 continued.

Kogo (n=32) & Borada T (n=187)	**5.05**	**5.37**	**4.277**	**6.9**	**5.52**	0.29	0.1	0.6	**7.13**
Kogo (n=32) & Ochollo (n=22)	**6.35**	**6.89**	1.66	-	**10.58**	**58.62**	0.0	0.5	-
Kogo (n=32) & Borada Z (n=565)	**12.44**	**8.71**	**6.09**	**2.37**	**9.53**	**26.48**	0.0	1.5	0.53
Zada (n=223) & Dorze (n=24)	**4.45**	1.89	1.6	**4.36**	**25.74**	**14.50**	0.2	0.1	**4.09**
Zada (n=223) & Borada T (n=187)	**7.12**	**12.30**	**4.32**	**5.96**	**21.64**	**48.56**	0.3	1.0	**3.05**
Zada (n=223) & Ochollo (n=22)	**3.14**	**6.27**	**7.21**	-	**28.39**	**15.34**	0.1	0.6	-
Zada (n=223) & Borada Z (n=565)	**13.46**	**15.53**	**16.6**	**16.24**	**25.53**	**8.03**	0.0	1.9	**17.26**
Dorze (n=24) & Borada T (n=187)	**5.57**	**3.73**	**2.43**	1.45	**11.25**	**9.03**	0.0	0.4	**2.59**
Dorze (n=24) & Ochollo (n=22)	**7.08**	**5.23**	6.74	-	3.91	50.97	0.0	0.6	-
Dorze (n=24) & Borada Z (n=565)	**12.37**	**4.15**	**8.49**	**11.37**	**16.53**	**15.45**	0.2	0.8	**12.63**
Borada T (n=187) & Ochollo (n=22)	0.75	0.61	**2.28**	-	**14.24**	**51.89**	0.1	0.1	-
Borada T (n=187) & Borada Z (n=565)	1.23	2.22	**5.16**	22.65	**4.71**	**57.55**	0.4	0.2	**20.48**
Ochollo (n=22) & Borada Z (n=565)	1.06	0.13	**2.24**	-	**20.51**	**23.22**	0.1	0.2	-

Table C-19: Moiety t-test for handles and sockets (bolded cells are significant at the 0.05 confidence level).

Mean Measure-ment in centi-meters	***Tutuma Dogala* (n=112)**	***Tutuma Mala* (n= 41)**	***Tutuma* T-test Results T-critical 1.96**	***Zucano Dogala* (n= 48)**	***Zucano Mala* (n= 28)**	***Zucano* T-test Results T-critical 1.96**
Length **(variance)**	36.97 (80.19)	36.39 (38.47)	0.04	26.88 (6.45)	26.87 (6.88)	0.01
Breadth/ Length (variance)	**0.089 (0)**	**0.087 (0)**	**33.26**	**0.287 (0.002)**	**0.266 (0.057)**	**2.56**
Thickness/ Length **(variance)**	0.09 (0.026)	0.088 (0.027)	0.41	0.141 (0.13)	0.128 (0.25)	0.29
Socket B/L ratio **(variance)**	4.17 (9.84)	3.60 (4.74)	0.36	**1.36 (0.07)**	**1.28 (0.08)**	**6.89**

Table C-20: Moiety mean measurements and t-test of unused scrapers (bolded cells are significant at the 0.05 confidence level).

Mean Measurements in centimeters (variance)	***Dogala* (n= 680)**	***Mala* (n=260)**	**T-test Results T-critical = 2.00**
Medial Breadth	2.47 (0.47)	2.65 (0.16)	**6**
Length	3.24(0.82)	4.15 (0.42)	**17**
Distal Thickness	0.45 (0.41)	0.40 (0.02)	**2.03**
Proximal Thickness	1.08 (0.18)	1.33 (0.11)	**21**
Breadth/Length	0.38 (0.03)	0.65 (0.14)	**47**
Thickness/Length	0.11 (0)	0.10 (0)	**87.5**

Table C-21: Moiety mean measurements and t-test of used-up scrapers (bolded cells are significant at the 0.05 confidence level).

Mean Measurements in centimeters (variance)	***Dogala* (n= 677)**	***Mala* (n= 372)**	**T-test Results T-critical =2.00**
Medial Breadth	2.34 (0.19)	2.57 (0.14)	**20**
Length	2.67 (0.41)	3.05 (0.40)	**22**
Distal Thickness	0.82 (0.10)	0.92 (0.09)	**16**
Proximal Thickness	1.08 (0.11)	1.19 (0.28)	**9.2**
Breadth/Length	0.74 (0.09)	0.88 (0.04)	**85**
Thickness/Length	0.32 (0.02)	0.32 (0.01)	0.67

Table C-22: Moiety and handle type measurements and t-test of unused scrapers (bolded cells are significant at the 0.05 confidence level).

Mean Measurement in centimeters	***Tutuma Dogala* (n=430)**	***Tutuma Mala* (n=34)**	***Tutuma* T-test Results T-critical = 1.96**	***Zucano Dogala* (n= 250)**	***Zucano Mala* (n= 226)**	***Zucano* T-test Results T-critical =1.96**
Breadth (**variance**)	2.50 (0.65)	2.72 (0.29)	**1.99**	2.42 (0.17)	2.65 (0.14)	**15.90**
Length (**variance**)	3.01 (0.89)	3.54 (0.68)	**3.39**	3.65 (0.45)	4.24 (0.32)	**16.51**
Distal Thickness (**variance**)	0.49 (0.63)	0.34 (0.02)	**4.32**	0.37 (0.03)	0.40 (0.02)	**13.60**
Proximal Thickness (**variance**)	1.04 (0.21)	1.22 (0.19)	**16.62**	1.16 (0.11)	1.35 (0.10)	**18.97**
Breadth/Length (**variance**)	0.39 (0.07)	0.81 (0.05)	**34.76**	0.68 (0.02)	0.63 (0.01)	**32.83**
Thickness /Length	0.12 (0)	0.10 (0)	**30.52**	0.10 (0)	0.10 (0)	**45.37**
Weight	9.82 (105.4)	13.27 (101.5)	0.18	11.05 (25.94)	15.76 (32.25)	1.76
Retouch Length	0.18 (0.04)	0.17 (0.03)	1.54	0.27 (0.04)	0.35 (0.03)	**26.6**
Distal Edge Angle	48.7 (128.8)	53.65 (142.7)	0.21	53.12 (81.25)	50.79 (99.65)	0.28

Table C-23: Moiety and handle type measurement and t-test of used-up scrapers (bolded cells are significant at the 0.05 confidence level).

Mean Measurement in centimeters	***Tutuma Dogala* (n= 430)**	***Tutuma Mala* (n= 58)**	**T-test Results Tcritical= 1.96**	***Zucano Dogala* (n= 247)**	***Zucano Mala* (n=314)**	**T-test Results T--critical = 1.96**
Breadth (**variance**)	2.35 (0.23)	2.72 (0.29)	**11.36**	2.34 (0.13)	2.50 (0.11)	**16.22**
Length (**variance**)	2.65 (0.47)	3.22 (0.41)	**8.87**	2.72 (0.32)	3.02 (0.39)	**9.68**
Proximal Thickness (**variance**)	1.05 (0.11)	1.24 (0.14)	**11.55**	1.13 (0.09)	1.18 (0.30)	**2.62**
Distal Thickness (**variance**)	0.78 (0.10)	0.84 (0.10)	**4.62**	0.90 (0.09)	0.93 (0.09)	**4.72**
Breadth/ Length (**variance**)	0.92 (0.05)	0.88 (0.06)	**6.29**	0.89 (0.04)	0.88 (0.04)	**4.33**
Thickness /Length (**variance**)	0.31 (0.02)	0.26 (0.01)	**17.45**	0.34 (0.02)	0.33 (0.02)	**12.97**
Weight	7.93 (26.1)	13.2 (38.9)	1.32	8.33 (15.93)	10.11 (15.36)	1.34
Retouch Length	0.87 (0.13)	.88 (0.14)	0.22	0.99 (0.12)	1.02 (0.09)	**3.15**
Distal Edge Angle	65.5 (167.6)	69.22 (167.5)	0.15	67.29 (149.3)	68.26 (146.7)	0.08

Table 24: Clan *zucano* handle mean breadth/length ratio and t-test results (bolded cells are signficant at the 0.05 confidence level).

Clan (Number of Handles)	**Clan 1** (listed 1st in 1st column) **Mean Breadth/ Length Ratio**	**Clan 2** (listed 2nd in 1st column) **Mean Breadth/ Length Ratio**	**T-test Results T-critical =2.00**
Damota (11) & Gezemala (17)	0.27 (0)	0.25 (0)	**12.21**
Damota (11) & Maagata (19)	0.27 (0)	0.27 (0)	**4.11**
Damota (11) & Zutuma (10)	0.27 (0)	0.004 (0)	**287.29**
Gezemala (17) & Maagata (19)	0.25 (0)	0.27 (0)	**17.13**
Gezemala (17)& Zutuma (10)	0.25 (0)	0.004 (0)	**184.41**
Maagata (19) & Zutuma (10)	0.27 (0)	0.004 (0)	**214.44**

Table C-25 Clan *tutuma* handle mean breadth/length ratio and t-test (bolded cells are significant at the 0.05 confidence level).

Clans (Number of Handles)	**Clan 1 Mean Breadth/ Length Ratio**	**Clan 2 Mean Breadth/ Length Ratio**	**T-test Results T-critical =2.00**
Amara (15) & Bola (19)	0.09 (0)	0.08 (0)	**47.68**
Amara (15) & Gezemala (36)	0.09 (0)	0.13 (0)	**19.82**
Amara (15) & Zutuma (40)	0.09 (0)	0.097 (0)	**62.44**
Bola (19) & Gezemala (36)	0.08 (0)	0.13 (0)	**25.66**
Bola (19) & Zutuma (40)	0.08 (0)	0.097 (0)	**176.89**
Gezemala (36) & Zutuma (40)	0.13 (0)	0.097 (0)	**27.38**

Table C-26: Clan *zucano* handle socket t-tests (bolded cells are significant at the 0.05 confidence level).

Clans (Number of Handles)	Clan 1 Mean Breadth/ Length Ratio	Clan 2 Mean Breadth/ Length Ratio	T-test Results T-critical =2.00
Damota (18) & Gezemala (34)	1.35 (0.06)	1.31 (0.08)	**2.18**
Damota (18) & Maagata (35)	1.35 (0.06)	1.44 (0.15)	**2.31**
Damota (18) & Zutuma (19)	1.35 (0.06)	1.38 (0.06)	1.74
Gezemala (34) & Maagata (35)	1.31 (0.08)	1.44 (0.15)	**4.53**
Gezemala (34) & Zutuma (19)	1.31 (0.08)	1.38 (0.06)	**3.76**
Maagata (35) & Zutuma (19)	1.44 (0.15)	1.38 (0.06)	1.62

Table C-27: Clan *tutuma* handle socket t-tests (bolded cells are significant at the 0.05 confidence level).

Clans (Number of Handles)	Clan 1 Mean Breadth/ Length Ratio	Clan 2 Mean Breadth/ Length Ratio	T-test Results T-critical =2.00
Amara (15) & Bola (19)	3.03 (1.49)	2.96 (1.42)	0.14
Amara (15) & Gezemala (36)	3.03 (1.49)	3.39 (4.97)	0.27
Amara (15) & Zutuma (40)	3.03 (1.49)	4.15 (5.26)	0.81
Bola (19) & Gezemala (36)	2.96 (1.42)	3.39 (4.97)	0.36
Bola (19) & Zutuma (40)	2.96 (1.42)	4.15 (5.26)	0.96
Gezemala (36) & Zutuma (40)	3.39 (4.97)	4.15 (5.26)	0.65

Table C-28: Clan unused scraper mean morphological measurements with variance.

Clan	Breadth cm	Length cm	Proximal Thickness	Distal Thickness	Breadth/ Length	Thickness /Length	Weight	Edge Angle	Retouch Length
Maagata (n=244)	2.42 (0.19)	3.65 (0.45)	1.16 (0.11)	0.37 (0.03)	0.68 (0.02)	0.10 (0)	11.1 (29)	53.1 (82.4)	0.27 (0.04)
Geze-mala (n=249)	2.63 (0.15)	4.16 (0.42)	1.32 (0.11)	0.24 (0.38)	0.65 (0.02)	0.09 (0)	15.25 (41)	51.15 (103)	0.33 (0.03)
Zutuma (n=296)	2.24 (0.33)	2.72 (0.46)	0.96 (0.19)	0.31 (0.02)	0.85 (0.05)	0.13 (0.05	6.18 (33)	46.9 (108)	1.99 (0.36)
Bolosa (n=64)	2.91 (1.07)	3.42 (1.46)	1.23 (0.24)	0.40 (0.06)	0.89 (0.10)	0.12 (0)	15.66 (99)	54.7 (164)	0.29 (0.08)
Damota (n=72)	2.79 (0.42)	4.08 (1.14)	1.19 (0.15)	0.45 (0.03)	0.71 (0.04)	0.25 (0.07	17.3 (331)	58.23 (176)	0.33 (0.05)

Table C-29: Clan unused scrapers t-test results (T-critical is 2.00, bolded cells are significant at the 0.05 confidence level).

Clan	Breadth	Length	Proximal Thick-ness	Distal Thick-ness	Breadth/ Length	Thickness /Length	Weight	Edge Angle	Retouch Length
Maagata & Damota	**10.8**	**4.8**	0.56	**22.45**	**11.6**	**31.07**	0.29	0.34	**11.51**
Maagata & Gezemala	**14.0**	**12.9**	**5.35**	**5.21**	**17.04**	**38.53**	1.25	0.24	**19.79**
Damota & Gezemala	**6.687**	0.86	1.62	**6.5**	**19.62**	**32.93**	0.09	0.43	**3.57**
Maagata &Zutuma	**7.43**	**23.44**	**8.75**	**28.25**	**52.05**	**44.43**	1.57	0.45	**44.11**
Maagata & Bolosa	**5.03**	**2.11**	**3.35**	**32.32**	**32.19**	**45.04**	0.61	0.11	**14.68**
Damota & Bolosa	0.89	**2.9**	1.43	**6.22**	**14.07**	**13.70**	0.04	0.12	**3.29**
Gezemala & Bolosa	**12.04**	**6.89**	**8.97**	**59.38**	**36.18**	**80.39**	0.05	0.22	**43.10**

Table C-29 continued.

Gezemala & Zutuma	**4.01**	**37.2**	1.99	**5.65**	**60.36**	**76.24**	**2.61**	0.63	**5.68**
Zutuma & Bolosa	**17.21**	**6.7**	**15.45**	**51.89**	**5.39**	1.49	1.24	0.13	**72.87**
Damota & Zutuma	**9.02**	**15.82**	**9.62**	**21.93**	**21.59**	**27.38**	0.53	0.08	**25.31**

Table C-30: Clan used-up scraper mean morphological measurements with variance.

Clan	**Breadth cm**	**Length cm**	**Proximal Thickness cm**	**Distal Thickness cm**	**Breadth /Length cm**	**Thickness/ Length cm**	**Weight**	**Edge Angle**	**Retouch Length cm**
Maa-gata (218)	2.31 (0.12)	2.65 (0.21)	1.10 (0.08)	0.89 (0.08)	0.89 (0.04)	0.35 (0.12)	7.77 (8.33)	68.0 (150)	0.99 (0.33)
Geze-mala (352)	2.56 (0.14)	3.0 (0.36)	1.17 (0.09)	0.92 (0.09)	0.88 (0.04)	0.32 (0.02)	10.39 (19.2)	68.4 (147)	1.00 (0.09)
Zu-tuma (239)	2.33 (0.21)	2.49 (0.60)	1.05 (0.09)	0.83 (0.11)	0.96 (0.04)	0.34 (0.33)	7.37 (19.4)	67.9 (151)	0.88 (0.14)
Bo-losa (142)	2.39 (0.26)	2.94 (0.60)	1.08 (0.18)	0.72 (0.09)	0.85 (0.05)	0.25 (0.01)	9.32 (41.2)	60.68 (150)	0.82 (0.12)
Da-mota (50)	2.29 (0.19)	2.86 (0.46)	1.12 (0.11)	0.76 (0.06)	0.82 (0.02)	0.34 (0.01)	8.90 (48.1)	64.02 (172)	0.87 (0.13)

Table C-31: Clan t-test for used-up scrapers results (T-critical is 2.00, bolded cells are significant at the 0.05 confidence level).

Clan	**Breadth**	**Length**	**Proximal Thickness**	**Distal Thickness**	**Breadth/Length**	**Thickness/ Length**	**Weight**	**Edge Angle**	**Retouch Length**
Maagata & Damota	1.03	**5.80**	**5.52**	**11.47**	**12.54**	**2.45**	0.33	0.16	**6.56**
Maagata & Geze-mala	**20.61**	**14.91**	**81.72**	**3.32**	**4.05**	**21.88**	1.9	0.03	1.63
Damota & Geze-mala	0.64	**2.66**	0.95	**7.73**	**9.36**	**10.52**	0.39	0.19	**8.91**
Maagata & Zutuma	**4.08**	**4.04**	**2.8**	**19.32**	**16.37**	**2.94**	0.28	0	**13.78**
Maagata & Bolosa	**8.53**	**7.39**	**47.19**	**22.79**	**9.88**	**54.09**	0.54	0.45	**17.23**
Damota & Bolosa	**16.11**	0.85	**76.50**	**11.56**	**4.29**	**37.51**	0.06	0.13	**12.08**
Geze-mala & Bolosa	**3.04**	**8.87**	**2.15**	**9.60**	**23.95**	**45.70**	0.39	0.53	**4.45**
Geze-mala & Zutuma	**11.62**	1.57	**38.46**	**12.66**	**6.93**	**43.64**	1.87	0.04	**8.24**
Zutuma & Bolosa	**2.62**	**16.79**	1.35	**2.79**	**21.7**	**16.95**	0.63	0.45	**2.55**
Damota & Zutuma	1.04	**5.99**	**4.26**	**4.11**	**23.24**	0.37	0.37	0.16	0.50

Table C-32: Chi-square test of village raw materials.

Raw Material	**Mogesa**	**Amure**	**Eeyahoo**	**Patela**	
Obsidian	31	30	24	65	**150**
Chert Yellow Brown	12	158	42	102	**314**
Chert Red	4	114	0	138	**256**
Chert Pink	0	0	3	4	**7**
Chert Purple	0	0	0	6	**6**
Chert Brown	21	17	2	41	**81**
Chert Black	189	12	0	32	**233**
Chert White	19	24	28	11	**82**
Chert Green	175	3	0	84	**262**
Chert Grey	36	92	152	11	**291**
	487	**450**	**252**	**494**	**1682**
	Observed	Expected			
	31	43.43	3.56		
	12	90.91	68.50		
	4	73.73	65.94		
	0	6.95	6.95		
	0	5.21	5.21		
	21	45.17	12.93		
	0	0.87	0.87		
	189	70.94	196.50		
	19	16.79	0.29		
	175	75.45	131.35		
	36	57.62	8.11		
	30	40.13	2.56		
	170	84.01	88.03		
	114	68.49	30.24		
	0	6.42	6.42		
	0	4.82	4.82		
	15	41.74	17.13		
	2	0.80	1.79		
	12	65.55	43.74		
	24	15.52	4.64		
	3	69.29	63.42		
	92	53.24	28.22		
	24	22.47	0.10		
	42	47.04	0.54		
	0	38.35	38.35		
	3	3.60	0.10		
	0	2.70	2.70		
	2	23.37	19.54		

Table C-32 continued.

	0	0.45	0.45		
	0	36.71	36.71		
	28	8.69	42.91		
	0	38.80	38.80		
	152	29.81	500.74		
	64	44.05	9.03		
	102	92.22	1.04		
	136	75.19	49.19		
	4	7.05	1.32		
	6	5.29	0.10		
	41	45.82	0.51		
	0	0.88	0.88		
	32	71.96	22.19		
	11	17.03	2.14		
	84	76.07	0.83		
	11	58.45	38.52		
			1346.45		
Degrees of freedom	27				
Significance level at0.05 = 40.1133					
Since 1346 is greater than 40.1133 than the differences are significant					

Table C-33: Lineage/ village handles mean breadth/length ratio and t-test results (bolded cells are significant at the 0.05 confidence level).

Village	Handle Type	Village 1 Mean Breadth/ Length	Village 2 Mean Breadth/ Length	T-test Results T-critical =2.00
Afilaketsa (n=5) & Amure (n=17)	*Zucano*	0.22 (0)	0.28 (0)	**49.2**
Afilaketsa (n=5) & Mogesa (n=12)	*Zucano*	0.22 (0)	0.27 (0)	**51.7**
Amure (n=17) & Mogesa (n=12)	*Zucano*	0.28 (0)	0.27 (0)	**10.3**
Eeyahoo (n=5) & Tzabo (n=5)	*Tutuma*	0.10 1(0)	0.09 (0)	**48.7**
Eeyahoo (n=5) & Patela (n=18)	*Tutuma*	0.101 (0)	0.103 (0)	**11.7**
Tzabo (n=5) & Patela (n=18)	*Tutuma*	0.09 (0)	0.103 (0)	**88.2**

Table C-34: Lineage/village socket mean measurements and t-test results (bolded cells are significant at the 0.05 confidence level).

Village	Handle Type	Village 1 Mean Breadth/ Length	Village 2 Mean Breadth/ Length	T-test Results T-critical = 2.00
Afilaketsa (n=5) & Amure (n=32)	*Zucano*	1.39 (0.03)	1.38 (0.08)	0.022
Afilaketsa (n=5) & Mogesa (n=24)	*Zucano*	1.39 (0.03)	1.31 (0.09)	1.73
Amure (n=5) & Mogesa (n=24)	*Zucano*	1.38 (0.08)	1.31 (0.09)	**3.09**
Eeyahoo (n=5) & Tzabo (n=5)	*Tutuma*	3.16 (0.37)	3.45 (2.57)	0.25
Eeyahoo (n=5) & Patela (n=18)	*Tutuma*	3.16 (0.37)	4.55 (5.72)	0.53
Tzabo (n=5) & Patela (n=18)	*Tutuma*	3.45 (2.57)	4.55 (5.72)	0.41

Table C-35: Lineage/village unused scrapers mean morphological measurements with variance.

Village	Breadth cm	Length cm	Proximal Thickness cm	Distal Thickness cm	Breadth/ Length cm	Thickness/ Length cm	Retouch Length cm
Patela (n=285) *Tutuma*	2.23 (0.33)	2.70 (0.41)	0.95 (0.19)	0.31 (0.01)	0.85 (0.05)	0.12 (0)	0.14 (0.02)
Eeyahoo (n=78) *Tutuma*	2.56 (0.38)	3.14 (0.66)	1.13 (0.17)	0.34 (0.02)	0.87 (0.10)	0.11 (0)	0.21 (0.03)
Mogesa (n=209) *Zucano*	2.62 (0.13)	4.25 (0.32)	1.34 (0.10)	0.40 (0.02)	0.62 (0.01)	0.09 (0)	0.35 (0.03)
Amure (n=239) *Zucano*	2.41 (0.07)	3.64 (0.45)	1.16 (0.10)	0.36 (0.3)	0.68 (0.02)	0.10 (0)	0.26 (0.03)

Table C-36: Lineage/village unused scrapers t-test results (T-critical = 1.96, bolded cells are significant at the 0.05 confidence level).

Village	**Breadth cm**	**Length cm**	**Proximal Thickness cm**	**Distal Thickness cm**	**Breadth/ Length cm**	**Thickness/ Lengthcm**	**Retouch Length cm**
Patela & Eeyahoo	**7.64**	**7.22**	**7.13**	**14.3**	**2.11**	**12.0**	**21.02**
Patela & Mogesa	**16.44**	**54.78**	**19.88**	**62.67**	**64.88**	**125.6**	**90.7**
Patela & Amure	**5.42**	**24.99**	**14.66**	**29.28**	**51.73**	**65.2**	**57.01**
Eeyahoo & Mogesa	**2.01**	**24.33**	**7.1**	**23.44**	**34.35**	**74.28**	**40.9**
Eeyahoo & Amure	**2.94**	**7.53**	1.99	**6.55**	**28.07**	**29.0**	**17.72**
Amure & Mogesa	**7.27**	**19.65**	**8.77**	**18.85**	**36.62**	**40.23**	**35.68**

Table C-37: Lineage/village used-up scrapers mean morphological measurements and variance. In Chapter 2, the village total is 881 for the used-up scrapers for all 4 villages. Here the total is 872 because 9 scrapers from Mogesa were not included in analysis because 1 individual made the scraper and another used them.

Village	**Breadth cm**	**Length cm**	**Proximal Thickness cm**	**Distal Thickness cm**	**Breadth/ Length cm**	**Thickness/ Length cm**	**Retouch Length cm**
Patela (n=209) *Tutuma*	2.29 (0.20)	2.43 (0.33)	1.03 (0.09)	0.80 (0.09)	0.97 (0.04)	0.35 (0.02)	0.87 (0.13)
Eeyahoo (n=174) *Tutuma*	2.45 (0.29)	2.96 (0.53)	1.10 (0.17)	0.73 (0.09)	0.86 (0.05)	0.25 (0.01)	0.82 (0.13)
Mogesa (n=278) *Zucano*	2.53 (0.11)	2.98 (0.34)	1.15 (0.08)	0.94 (0.09)	0.88 (0.04)	0.33 (0.02)	1.03 (0.09)
Amure (n=211) *Zucano*	2.31 (0.11)	2.64 (0.20)	1.10 (0.08)	0.89 (0.08)	0.89 (0.04)	0.35 (0.02)	0.99 (0.11)

Table C-38: Lineage/village used-up scrapers t-test results (T-critical is 1.96, bolded cells are significant at the 0.05 confidence level).

Village	Breadth cm	Length cm	Proximal Thickness cm	Distal Thickness cm	Breadth/ Length cm	Thickness/ Length cm	Retouch Length cm
Patela & Eeyahoo	**6.31**	**11.94**	**4.55**	**7.63**	**21.77**	**5.79**	**3.67**
Patela & Mogesa	**16.91**	**17.84**	**15.17**	**15.85**	**23.47**	1.41	**16.11**
Patela & Amure	1.23	**7.87**	**7.76**	**10.51**	**16.82**	0.24	**10.6**
Eeyahoo & Mogesa	**4.02**	0.46	**4.74**	**23.94**	**4.2**	**52.48**	**20.4**
Eeyahoo & Amure	**6.4**	**8.08**	0.31	**18.63**	**7.71**	**59.99**	**14.4**
Amure & Mogesa	**21.78**	**12.85**	**7.18**	**5.31**	**5.09**	**14.30**	**4.39**

Table C-39: Mogesa domestic group unused scraper mean measurements.

Measurement in cm	Yeka group (n=31)	Buta group (n=90)	Mokano group (n=88)
Breadth	2.95 (0.13)	2.64 (0.13)	2.45 (0.09)
Length	4.30 (0.35)	4.22 (0.32)	4.26 (0.03)
Proximal Thickness	1.31 (0.07)	1.28 (0.10)	1.41 (0.11)
Distal Thickness	0.47 (0.03)	0.36 (0.01)	0.42 (0.02)
Breadth/ Length	0.70 (0.01)	0.63 (0.01)	0.59 (0.01)
Thickness/ Length	0.11 (0)	0.09 (0)	0.10 (0)
Retouch length	0.38 (0.02)	0.34 (0.03)	0.36 (0.02)
Distal edge angle	50.51 (50.59)	48.21 (107.55)	53.39 (59.89)

Table C-40: Mogesa domestic group t-test results for unused scrapers (T-Critical = 1.99, bolded cells are significant at the 0.05 confidence level).

Measurement in cm	**Yeka (n=31) -Buta (n= 90) groups**	**Yeka (n=31)-Mokano (n=88) groups**	**Buta (n=90)-Mokano (n=88) group**
Breadth	**11.55**	**23.96**	**11.80**
Length	1.07	0.95	1.10
Proximal thick	1.50	**4.97**	**8.58**
Distal thick	**26.82**	**11.63**	**24.53**
Breadth/ Length	**32.35**	**36.95**	**29.32**
Thickness/ Length	**87.00**	**40.93**	**74.44**
Retouch length	**5.80**	**3.61**	**4.74**
Distal edge angle	0.11	0.21	0.38

Table C-41: Amure domestic group unused scraper mean measurements.

Measurement in cm	**Hanicha group (n= 99)**	**Gamana group (n=81)**	**Hagay group (n=59)**
Breadth	2.40 (0.16)	2.50 (0.17)	2.30 (0.17)
Length	3.59 (0.31)	4.00 (0.43)	3.23 (0.37)
Proximal Thickness	1.19 (0.09)	1.18 (0.11)	1.07 (0.12)
Distal Thickness	0.37 (0.02)	0.35 (0.02)	0.36 (0.04)
Breadth/ Length	0.68 (0.01)	0.63 (0.01)	0.73 (0.03)
Thickness/ Length	0.11 (0)	0.09 (0)	0.11 (0)
Retouch Length	0.26 (0.03)	0.28 (0.03)	0.25 (0.06)
Distal Edge Angle	53 (58.8)	53.6 (65.1)	54.5 (108.60

Table C-42: Amure domestic group t-test results for unused scrapers (T-Critical = 1.99, bolded cells are significant at the 0.05 confidence level).

Measurement in cm	Hanicha-Gamana	Hanicha-Hagay	Hagay-Gamana
Breadth	**3.89**	**3.81**	**6.80**
Length	**7.27**	**6.61**	**11.02**
Proximal Thick	0.63	**7.17**	**5.76**
Distal Thickness	**5.71**	**3.69**	0.33
Breadth/ Length	**24.59**	**16.27**	**26.63**
Thickness/ Length	**55.92**	**13.61**	**51.74**
Retouch Length	**5.63**	0.50	**3.75**
Distal Edge Angle	0.07	0.09	0.04

Table C-43: Patela domestic group unused scraper mean measurements.

Measurement in cm	Arka group (n= 96)	Garcho group (n=79)	Tina group (n=41)	Darsa group (n=69)
Breadth	2.26 (0.41)	2.14 (0.31)	2.28 (0.36)	2.27 (0.21)
Length	2.66 (0.54)	2.62 (0.34)	2.75 (0.32)	2.83 (0.35)
Proximal Thickness	0.89 (0.17)	0.94 (0.13)	1.07 (0.48)	0.99 (0.12)
Distal Thickness	0.33 (.01)	0.27 (0.02)	0.31 (0.02)	0.32 (0.02)
B/L	0.88 (0.06)	0.84 (0.06)	0.85 (0.04)	0.82 (0.03)
T/L	0.13 (0)	0.11 (0)	0.12 (0)	0.12 (0)
Retouch Length	0.13 (0.03)	0.11 (.01)	0.22 (0.03)	0.17 (0.02)
Distal Edge Angle	47.18 (111.99)	44.05 (106.27)	47.92 (98.92)	50.50 (79.48)

Table C-44: Patela domestic group t-test results for unused scrapers (T-Critical = 1.99, bolded cells are significant at the 0.05 confidence level).

Measurement in cm	Arka-Garcho	Arka-Tina	Arka-Darsa	Garcho-Tina	Garcho-Darsa	Tina-Darsa
Breadth	**2.27**	0.29	0.12	**2.34**	**3.00**	0.27
Length	0.56	0.96	**2.26**	1.94	**3.60**	1.22
Proximal Thickness	2.33	**3.23**	**4.50**	**2.17**	**2.57**	1.18
Distal Thickness	**29.29**	**8.51**	**5.07**	**13.56**	**19.58**	**3.18**
Breadth/ Length	**4.08**	**3.05**	**7.56**	0.53	**2.83**	**4.08**
Thickness/ Length	**64.86**	**31.66**	**41.95**	**21.75**	**26.21**	1.47
Retouch	**5.70**	**16.61**	**11.92**	**26.52**	**27.34**	**10.02**
Distal Edge Angle	0.19	0.04	0.21	0.19	0.41	0.15

Table C-45: Mogesa domestic group used-up scraper mean measurements.

Measurement in cm	Yeka group (n=68)	Buta group (n=146)	Mokano group (n=64)
Breadth	2.62 (0.07)	2.53 (0.13)	2.43 (0.07)
Length	2.47 (0.08)	3.11 (0.31)	3.21 (0.33)
Proximal Thickness	1.10 (0.06)	1.18 (0.08)	1.16 (0.09)
Distal Thickness	0.98 (0.06)	0.93 (0.09)	0.89 (0.11)
Breadth/ Length	1.08 (0.03)	0.84 (0.03)	0.78 (0.02)
Thickness/ Length	0.40 (0.01)	0.31 (0.02)	0.29 (0.01)
Retouch Length	1.04 (0.07)	1.04 (0.09)	0.99 (0.10)
Distal Edge Angle	68.59 (59.69)	67.75 (139.61)	64.09 (91.71)

Table C-46: Mogesa domestic group t-test results for used-up scrapers (T-Critical = 1.99, bolded cells are significant at the 0.05 confidence level).

Measurement in cm	Yeka-Buta group	Yeka-Mokano group	Buta-Mokano groups
Breadth	**3.70**	**12.50**	**6.45**
Length	**11.42**	**12.48**	**2.27**
Proximal Thick	**4.55**	**3.07**	1.29
Distal Thickness	**2.50**	**4.13**	**2.81**
Breadth/ Length	**37.64**	**60.78**	**14.92**
Thickness/ Length	**27.73**	**86.88**	**157.89**
Retouch Length	0.29	0.28	0.42
Distal Edge Angle	0.32	0.34	0.22

Table C-47: Amure domestic group used-up scraper mean measurements.

Measurement in cm	Hanicha group (n=102)	Gamana group (n=76)	Hagay group (n= 33)
Breadth	2.34 (0.09)	2.24 (0.13)	2.37 (0.13)
Length	2.72 (0.14)	2.62 (0.23)	2.46 (0.27)
Proximal Thickness	1.10 (0.08)	1.09 (0.09)	1.13 (0.08)
Distal Thickness	0.87 (0.09)	0.88 (0.07)	0.99 (0.07)
Breadth/ Length	0.88 (0.03)	0.88 (0.04)	1.00 (0.07)
Thickness/ Length	0.33 (0.01)	0.35 (0.02)	0.42 (0.02)
Retouch Length	0.99 (0.13)	0.96 (0.08)	1.04 (0.07)
Distal Edge Angle	64.9 (70.79)	68.6 (141.36)	71.62 (111.84)

Table C-48: Amure domestic group t-test results for used-up scrapers (T-Critical is 1.99, bolded cells are significant at the 0.05 confidence level).

Measurement in cm	Hanicha-Gamana	Hanicha-Hagay	Hagay-Gamana
Breadth	**22.40**	**18.70**	**4.81**
Length	**3.52**	**7.21**	**3.19**
Proximal Thick	0.26	**2.11**	1.90
Distal Thickness	0.58	**7.05**	**8.04**
Breadth/ Length	0.11	**14.07**	**11.87**
Thickness/ Length	**8.51**	**27.54**	**18.52**
Retouch Length	1.52	1.98	**4.54**
Distal Edge Angle	0.16	0.32	0.14

Table C-49: Patela domestic group used-up scraper mean measurements (Garcho group does not contain Garcho scrapers since he is retired, but those of his sons).

Measurement in cm	Arka Group (n= 76)	Garcho group (n=26)	Tina group (n=42)	Darsa group (n=61)
Breadth	2.41 (0.24)	2.24 (0.20)	2.27 (0.13)	2.16 (0.16)
Length	2.53 (0.38)	2.36 (0.25)	2.35 (0.21)	2.37 (0.36)
Proximal Thickness	1.02 (0.08)	1.08 (0.15)	1.07 (0.09)	1.01 (0.11)
Distal Thickness	0.76 (0.09)	0.91 (0.14)	0.85 (0.10)	0.79 (0.08)
Breadth/ Length	0.99 (0.06)	0.96 (0.02)	0.99 (0.04)	0.94 (0.04)
Thickness/ Length	0.32 (0.03)	0.38 (0.01)	0.37 (0.02)	0.35 (0.02)
Retouch	0.87 (0.19)	0.98 (0.13)	0.89 (0.08)	0.80 (0.08)
Distal Edge Angle	66.86 (154.57)	69.03 (110.27)	69.56 (89.27)	66.93 (101.41)

Table C-50: Patela domestic group t-test results for used-up scrapers (T-Critical is 1.99, bolded cells are significant at the 0.05 confidence level).

Measurement in cm	Arka-Garcho	Arka-Tina	Arka-Darsa	Garcho-Tina	Garcho-Darsa	Tina-Darsa
Breadth	**3.19**	**3.37**	**7.14**	0.67	**2.15**	**3.98**
Length	**2.14**	**2.78**	**2.50**	0.08	0.17	0.29
Proximal Thickness	**2.61**	**3.07**	0.48	0.31	**2.41**	**2.85**
Distal Thickness	**6.36**	**5.17**	**2.24**	1.74	**4.95**	**3.34**
Breadth/ Length	**2.07**	0.26	**5.52**	**3.19**	**2.94**	**6.63**
Thickness/ Length	**11.07**	**9.36**	**6.36**	**4.29**	**8.03**	**4.37**
Retouch	**2.91**	0.79	**2.38**	**3.11**	**8.14**	**5.59**
Distal Edge Angle	0.07	0.10	0.00	0.02	0.09	0.14

Table C-51: Mogesa individual unused scraper mean measurements.

Individual	**Breadth (variance)**	**Length (variance)**	**Proximal Thickness (variance)**	**Distal Thickness (variance)**	**Breadth/Length Ratio (variance)**	**Thickness/ Length Ratio (variance)**	**Retouch Length (variance)**
Buta (n=32)	2.63 (0.12)	4.03 (0.25)	1.15 (0.10)	0.32 (0.01)	0.60 (0)	0.08 (0)	0.34 (0.04)
Tesfy (n=30)	2.78 (0.11)	4.68 (0.17)	1.15 (0.07)	0.36 (0.01)	0.66 (0.01)	0.08 (0)	0.26 (0.02)
Goa (n=28)	2.5 (0.11)	3.95 (0.25)	1.38 (0.09)	0.42 (0.03)	0.64 (0.01)	0.11 (0)	0.43 (0.03)
Mokano (n=30)	2.48 (0.08)	4.24 (0.39)	1.38 (0.10)	0.43 (0.01)	0.60 (0.01)	0.10 (0)	0.41 (0.01)
Mola (n=30)	2.57 (0.06)	4.26 (0.29)	1.54 (0.11)	2.14 (0.06)	0.61 (0.01)	0.09 (0)	0.32 (0.02)
Yonja (n=28)	2.43 (0.12)	4.28 (0.26)	1.33 (.09)	0.43 (0.02)	0.57 (0.01)	0.10 (0)	0.35 (0.03)
Yeka (n=31)	2.95 (0.13)	4.29 (0.35)	1.31 (.07)	0.47 (0.03)	0.70 (0.01)	0.11 (0)	0.38 (0.02)

Table C-52: Mogesa t-test results for unused scrapers (T-critical is 1.96, bolded cells are significant at the 0.05 confidence level).

Individuals	Breadth	Length	Proximal Thickness	Distal Thick	Breadth/ Length	Thickness/ Length	Retouch Length
Tesfy & Buta	**5.51**	**11.98**	**3.05**	**19.07**	**31.64**	**17.33**	**11.25**
Tesfy & Goa	**9.66**	**13.2**	0.5	**11.61**	**17.92**	**77.47**	**8.83**
Tesfy & Mokano	**44.8**	**5.64**	0.53	**23.08**	0.58	**164.81**	**9.49**
Tesfy &Mola	**1.99**	**6.75**	3.20	**11.38**	**10.59**	**82.98**	**3.22**
Tesfy&Yonj	**11.47**	**6.94**	0.23	**18.31**	**15.33**	**93.85**	0.70
Tesfy &Yeka	**5.26**	**5.47**	**15.07**	**108.11**	**51.76**	**128.05**	**4.16**
Buta & Goa	**3.72**	**4.31**	**10.53**	**21.39**	**5.16**	**75.13**	**25.37**
Buta & Mokano	**4.84**	**2.47**	**9.99**	**42.17**	**22.77**	**160.26**	**46.14**
Buta & Mola	0.41	**3.32**	**16.26**	**24.49**	**23.91**	**76.95**	**11.65**
Buta & Yonja	**5.8**	**3.75**	**8.31**	**32.58**	**38.61**	**89.83**	**14.17**
Buta & Yeka	**10.33**	**3.46**	**9.05**	**30.34**	**16.29**	**124.97**	**23.91**
Goa & Mokano	0.68	**3.33**	0.06	**2.31**	**13.97**	**14.62**	**2.34**
Goa & Mola	0.34	**4.37**	**6.14**	**2.52**	**12.38**	**29.96**	**14.81**
Goa & Yonja	**2.35**	**4.87**	1.87	1.84	**24.63**	**13.08**	**8.87**
Goa & Yeka	**14.24**	**4.3**	**2.93**	**7.32**	**18.32**	1.73	**6.81**
Mokano & Mola	0.83	0.26	**5.91**	**6.48**	**5.48**	**30.91**	**21.19**
Mokano & Yonja	**2.07**	0.47	1.85	0.35	**10.15**	0.92	**10.23**
Mokano & Yeka	**16.7**	0.59	**2.82**	**6.91**	**37.39**	**25.81**	**7.802**
Mola & Yonja	1.29	0.27	**7.80**	**5.34**	**22.93**	**21.58**	**4.57**
Mola & Yeka	**3.59**	0.4	**9.53**	**10.89**	**43.48**	**46.14**	**10.32**
Yonja & Yeka	**15.77**	0.18	0.73	**6.52**	**56.16**	**20.54**	**3.78**

Table C-53: Amure individual unused scraper mean measurements and variance.

Individual	Breadth	Length	Proxi-mal Thick-ness	Distal Thickness	Breadth/ Length Ratio	Thickness/ Length Ratio	Retouch Length
Hanicha (n=30)	2.27 (0.14)	3.39 (0.42)	1.12 (0.12)	0.29 (0.02)	0.68 (0.02)	0.09 (0)	0.20 (0.02)
Osha (n=30)	2.33 (0.10)	3.59 (0.13)	1.13 (0.06)	0.45 (0.02)	0.65 (0.08)	0.13 (0)	0.23 (0.01)
Galche (n=21)	2.67 (0.32)	4.18 (0.28)	1.23 (0.11)	0.36 (0.02)	0.64 (0.01)	0.09 (0)	0.26 (0.02)
Bedala (n=39)	2.54 (0.18)	3.75 (0.33)	1.29 (0.08)	0.38 (0.02)	0.69 (0.01)	0.11 (0)	0.32 (0.04)
Gamana (n=29)	2.33 (0.13)	3.5 (0.25)	1.11 (0.11)	0.34 (0.02)	0.67 (0.01)	0.08 (0)	0.29 (0.02)
Mardos (n=31)	2.52 (0.07)	4.33 (0.34)	1.21 (0.10)	0.36 (0.02)	0.59 (0.01)	0.08 (0)	0.29 (0.04)
Hagay (n=30)	2.19 (0.14)	2.89 (0.19)	1.08 (0.11)	0.34 (0.04)	0.78 (0.03)	0.12 (0)	0.23 (0.06)
Chamo (n=29)	2.40 (0.18)	3.58 (0.32)	1.06 (0.13)	0.37 (0.03)	0.69 (0.03)	0.11 (0)	0.28 (0.05)

Table C-54: Amure t-test results for unused scrapers (T-critical = 1.96, bolded cells are significant at the 0.05 confidence level).

Individual	Breadth	Length	Proximal Thickness	Distal Thick	Breadth/ Length	Thickness /Length	Retouch Length
Hanicha & Osha	1.9	2.42	0.41	**30.98**	**2.09**	**50.35**	**7.34**
Hanicha & Galche	**6.23**	**7.47**	**3.63**	**12.3**	**9.59**	**8.75**	**2.17**
Hanicha & Bedala	**7.03**	**3.91**	**7.04**	**18.5**	1.04	**27.52**	**15.03**
Hanicha & Gamana	1.98	1.15	0.33	**9.6**	**3.17**	**13.04**	**17.28**
Hanicha Mardos	**8.86**	**9.55**	**3.18**	**13.6**	**28.40**	**16.31**	**11.05**
Hanicha & Hagay	**2.21**	**6.01**	1.34	**6.12**	**13.42**	**29.40**	**2.59**
Hanicha & Chamo	**3.10**	1.87	1.53	**12.09**	0.49	**18.30**	**8.11**
Osha & Galche	**5.31**	**10.10**	**4.59**	**15.81**	0.53	**75.92**	1.09
Osha & Bedala	**6.01**	**2.49**	**9.14**	**14.41**	**2.67**	**21.47**	**12.09**
Osha & Gamana	0.33	1.76	0.87	**21.12**	1.37	**71.95**	**14.64**
Osha & Mardos	**8.62**	**11.09**	**3.77**	**17.57**	**4.08**	**97.98**	**7.97**

Table C-54 continued.

Osha & Hagay	**4.45**	**16.5**	**2.18**	**13.47**	**7.66**	**9.61**	0
Osha & Chamo	1.85	0.16	**2.28**	**12.09**	**2.18**	**25.48**	**5.36**
Galche & Bedala	**2.01**	**5.07**	**2.01**	**3.69**	**13.06**	**37.97**	**2.36**
Galche & Gamana	**5.17**	**9.06**	**4.12**	**3.48**	**9.86**	**5.92**	1.06
Galche & Mardos	**2.70**	1.66	1.01	0	**17.62**	**12.17**	1.06
Galche & Hagay	**7.4**	**19.37**	**5.11**	**2.1**	**17.17**	**36.78**	0.99
Galche & Chamo	**3.93**	**6.83**	**4.86**	1.32	**7.47**	**27.47**	0.67
Bedala &Gamana	**5.32**	**3.41**	**7.81**	**8.15**	**5.37**	**42.95**	**3.7**
Bedala & Mardos	0.87	**7.21**	**3.71**	**4.15**	**37.72**	**51.50**	**3.11**
Bedala & Hagay	**9.04**	**12.65**	**9.18**	**5.43**	**15.09**	**7.52**	**7.46**
Bedala & Chamo	**3.39**	**2.11**	**8.61**	1.64	0.21	**6.24**	**3.66**
Gamana&Mardos	**6.73**	**10.70**	**3.68**	**3.87**	**39.08**	0.02	0
Gamana & Hagay	**4.26**	**10.58**	1.04	0	**15.91**	**41.91**	**5.11**
Gamana &Chamo	1.45	1.04	1.26	**4.48**	**2.80**	**31.57**	1
Mardos & Hagay	**11.7**	**20.06**	**4.83**	**2.48**	**29.62**	**48.94**	**4.6**
Mardos & Chamo	**3.44**	**8.711**	**4.69**	1.52	**20.51**	**38.22**	0.85
Hagay & Chamo	**5.01**	**9.95**	0.34	**3.25**	**11.59**	**11.69**	**3.47**

Table C-55: Eeyahoo individual unused scraper mean measurements and variance.

Individual	**Breadth**	**Length**	**Proximal Thickness**	**Distal Thickness**	**Breadth/ Length Ratio**	**Thickness/ Length Ratio**	**Retouch Length**
Arba (n=23)	2.69 (0.33)	3.65 (0.86)	1.32 (0.19)	0.32 (0.02)	0.78 (0.06)	0.10 (0)	0.13 (0.03)
Amaylo (n=27)	2.52 (0.36)	2.96 (0.38)	.94 (0.14)	0.34 (0.01)	0.90 (0.12)	0.12 (0)	0.22 (0.03)
Awesto (n=28)	2.5 (0.44)	2.89 (0.49)	1.14 (0.13)	0.36 (0.04)	0.92 (0.12)	0.13 (0)	0.26 (0.03)
Anko (n=19)	4 (0.95)	4.78 (1.26)	1.64 (0.19)	0.54 (0.12)	0.86 (0.03)	0.12 (0.01)	0.42 (0.17)

Table C-56: Eeyahoo t-test results for unused scraper (T-critical is 2.00, bolded cells are significant at the 0.05 confidence level).

Individual	Breadth	Length	Proximal Thickness	Distal Thick-ness	Breadth/ Length Ratio	Thickness/ Length Ratio	Retouch Length
Arba & Amaylo	1.67	**3.74**	**7.64**	**3.19**	**4.53**	**33.02**	**11.04**
Arba & Awesto	1.67	**3.88**	**3.8**	**4.5**	**5.01**	**32.36**	**14.36**
Arba & Anko	6.2	**3.43**	**5.26**	**8.59**	**5.38**	**15.29**	**8.42**
Amaylo & Awesto	0.16	0.52	**5.45**	**3.07**	0.63	**9.82**	**4.45**
Amaylo & Anko	**7.39**	**7.06**	**13.8**	**8.72**	1.46	**3.36**	**6.22**
Awesto & Anko	**7.31**	**7.13**	**10.59**	**7.43**	**2.06**	1.53	**5.09**

Table C-57: Patela individual unused scraper measurements and variance.

Individual	Breadth	Length	Proximal Thickness	Distal Thickness	Breadth/ Length Ratio	Thickness/ Length Ratio	Retouch Length
Darsa (n=26)	2.28 (0.21)	2.85 (0.27)	0.28 (0.01)	0.97 (0.12)	0.82 (0.03)	0.15 (0.05)	0.23 (0.01)
Garbo (n=21)	2.11 (0.16)	2.66 (0.47)	0.88 (0.09)	0.26 (0)	0.87 (0.04)	0.14 (0)	0.13 (0.02)
Gaga (n=22)	2.39 (0.25)	2.95 (0.33)	1.13 (0.14)	0.31 (0.02)	0.87 (0.25)	0.10 (0)	0.14 (0.01)
Tina (n=22)	2.35 (0.37)	2.78 (0.39)	1.08 (0.21)	0.36 (0.01)	1.00 (0.09)	0.12 (0)	0.24 (0.03)
Tinko (n=19)	2.2 (0.35)	2.71 (0.24)	1.05 (0.82)	0.25 (0.01)	0.82 (0.02)	0.10 (0)	0.19 (0.03)
Unkay (n=24)	2.68 (0.78)	2.80 (0.94)	1.0 (0.22)	0.32 (0.01)	0.82 (0.04)	0.10 (0)	0.21 (0.06)
Arka (n=25)	2.24 (0.16)	2.8 (0.36)	0.84 (0.09)	0.34 (0.01)	0.82 (0.03)	0.16 (0.01)	0.16 (0.02)
Abata (n=23)	2.07 (0.18)	2.48 (0.39)	0.38 (0.01)	0.87 (0.24)	0.87 (0.05)	0.15 (0)	0.05 (0)

Table C-57 continued.

Basa (n=24)	2.05 (.28)	2.54 (0.44)	0.83 (0.12)	0.32 (0.01)	0.83 (0.04)	0.12 (0)	0.07 (0.01)
Garcho (n=30)	2.03 (0.24)	2.66 (0.34)	0.89 (0.09)	0.26 (0.01)	0.84 (0.05)	0.13 (0)	0.14 (0.01)
Tsoma (n=22)	2.01 (0.30)	2.37 (0.26)	0.87 (0.15)	0.29 (0.04)	0.88 (0.07)	0.12 (0.01)	0.14 (0.01)
Uma (n=27)	2.35 (0.34)	2.79 (0.36)	1.05 (0.14)	0.27 (0)	0.79 (0.04)	0.10 (0)	0.04 (0)

Table C-58: Patela t-test results for unused scrapers (T-critical is 2.20, bolded cells are significant at the 0.05 confidence level).

Individual	**Breadth**	**Length**	**Proximal Thickness**	**Distal Thickness**	**Breadth/ Length Ratio**	**Thickness/ Length Ratio**	**Retouch Length**
Gaga- Tina	0.42	1.62	0.93	**10.49**	**3.89**	1.47	**14.83**
Gaga- Uma	0.46	1.72	1.99	**9.10**	0.89	**5.53**	**52.09**
Gaga-Unkay	1.67	0.72	**2.37**	2.17	**8.41**	**3.46**	**5.40**
Gaga-Garbo	4.20	**2.34**	**6.93**	**10.29**	0.52	**4.41**	2.09
Gaga-Tinko	2.02	**2.70**	0.45	**11.85**	0.03	**5.02**	5.67
Gaga-Darsa	1.66	1.22	**4.26**	**15.70**	0.77	0.89	**31.07**
Gaga-Abata	**3.40**	**3.17**	**4.41**	**10.68**	**3.47**	0.48	**30.18**
Gaga-Arka	**2.48**	1.54	**8.24**	**6.62**	0.15	**2.84**	**4.24**
Gaga-Basa	**4.33**	**3.58**	**7.56**	2.17	0.29	1.90	**23.72**
Gaga-Tsoma	**4.56**	**6.56**	**5.94**	2.10	**3.35**	**2.58**	0.00
Gaga-Garcho	**5.25**	**3.16**	**7.22**	**11.85**	**3.37**	**6.18**	0.00
Tina- Uma	0.00	0.07	0.60	**31.34**	0.06	**75.74**	**34.73**
Tina-Unkay	1.81	0.11	1.26	**13.55**	**6.05**	**33.79**	2.11
Tina-Garbo	**2.62**	0.83	**4.02**	**32.78**	**4.62**	**53.46**	**14.08**
Tina-Tinko	1.33	0.64	0.17	**35.12**	**3.35**	**62.02**	**4.56**
Tina-Darsa	0.82	0.76	**2.27**	**6.90**	**4.81**	**7.77**	1.60
Tina-Abata	2.09	1.90	**3.12**	0.00	0.27	**15.87**	**28.76**
Tina-Arka	1.35	0.21	**5.10**	**6.84**	**3.56**	**22.66**	**10.87**
Tina-Basa	**3.12**	1.88	**4.81**	**13.55**	**3.05**	**5.02**	**26.24**
Tina-Tsoma	**3.35**	**4.01**	**3.82**	**7.96**	0.71	**7.27**	**14.83**
Tina-Garcho	**3.78**	1.17	**4.34**	**35.63**	**6.72**	**74.09**	**17.06**
Uma-Unkay	2.00	0.08	0.98	**17.82**	**2.38**	**50.94**	**14.74**
Uma-Garbo	**2.86**	0.99	**4.84**	**3.44**	0.95	**14.06**	**23.46**
Uma-Tinko	1.46	0.79	0.00	**6.68**	0.83	**11.04**	**19.58**
Uma-Darsa	0.90	0.75	**2.23**	**40.03**	1.11	**21.81**	**98.76**

Table C-58 continued.

Uma-Abata	**2.28**	2.17	**3.30**	**31.72**	0.12	**105.87**	**5.21**
Uma-Arka	1.47	0.15	**6.18**	**25.22**	0.91	**76.02**	**31.20**
Uma-Basa	**3.41**	2.16	**5.71**	**17.82**	0.85	**61.48**	**15.61**
Uma-Tsoma	**3.67**	**4.53**	**4.34**	**2.51**	0.18	**17.46**	**52.09**
Uma-Garcho	**4.14**	1.38	**5.00**	**3.77**	1.83	**9.14**	**51.91**
Unkay-Garbo	**3.23**	0.60	2.33	**20.08**	**8.63**	**28.24**	**5.83**
Unkay-Tinko	**2.49**	0.41	0.29	**22.80**	**7.63**	**42.73**	1.25
Unkay-Darsa	**2.52**	0.25	0.60	**21.20**	**9.47**	**14.64**	1.68
Unkay-Abata	**3.06**	1.38	1.94	**13.71**	**6.27**	**56.01**	**12.62**
Unkay-Arka	**2.76**	0.01	**3.30**	**7.00**	**8.58**	**16.74**	**3.95**
Unkay-Basa	**3.72**	1.21	**3.13**	0.00	**8.07**	**25.29**	**11.28**
Unkay-Tsoma	**3.78**	2.07	**2.32**	**3.56**	**4.75**	**4.83**	**5.40**
Unkay-Garcho	**4.32**	0.78	**2.45**	**21.91**	**11.12**	**48.89**	**6.30**
Garbo-Tinko	0.94	0.36	0.95	**3.16**	0.38	**17.74**	**6.09**
Garbo-Darsa	**2.88**	1.68	**2.85**	**40.90**	0.31	**17.62**	**22.31**
Garbo-Abata	0.97	1.12	0.18	**33.13**	**4.12**	**76.54**	**17.01**
Garbo-Arka	**2.53**	1.09	1.41	**27.03**	0.62	**46.21**	**5.07**
Garbo-Basa	1.01	0.89	1.25	**20.08**	0.70	**43.48**	**12.97**
Garbo-Tsoma	1.49	**2.55**	0.26	**3.34**	**3.68**	**12.24**	2.09
Garbo-Garcho	1.50	0.09	0.37	0.00	**3.13**	**18.36**	**2.36**
Tinko-Darsa	0.96	1.81	0.49	**43.07**	0.61	**19.51**	**4.91**
Tinko-Abata	0.36	1.52	1.00	**35.48**	**3.02**	**83.28**	**16.22**

Table C-58 continued.

Tinko-Arka	0.51	0.94	1.27	**29.57**	0.16	**58.97**	**3.26**
Tinko-Basa	1.56	1.48	1.24	**22.80**	0.28	**52.62**	**14.19**
Tinko-Tsoma	1.87	**4.31**	1.01	**4.24**	**3.01**	**16.97**	**5.67**
Tinko-Garcho	2.02	0.60	1.06	**3.41**	**2.90**	**2.92**	**6.57**
Darsa-Abata	1.96	2.75	1.88	**6.99**	4.35	**4.55**	**59.39**
Darsa-Arka	0.76	0.57	**4.19**	**14.28**	0.87	**12.60**	**13.63**
Darsa-Basa	**3.30**	**3.00**	**3.83**	**21.20**	0.93	**9.31**	**52.99**
Darsa-Tsoma	**3.65**	**6.25**	**2.57**	**11.09**	**4.06**	**10.62**	**27.62**
Darsa-Garcho	**4.12**	**2.32**	**2.72**	**44.79**	**2.93**	**24.07**	**29.86**
Abata-Arka	**3.46**	**2.20**	0.57	**6.92**	**3.20**	**44.97**	**23.77**
Abata-Basa	0.29	0.43	0.55	**13.71**	**2.75**	**20.32**	**6.85**
Abata-Tsoma	0.82	0.73	0.00	**8.14**	0.90	**14.06**	**30.18**
Abata-Garcho	0.67	1.32	0.41	**36.08**	**6.35**	**100.00**	**32.47**
Arka-Basa	**2.93**	**2.23**	0.00	**7.00**	0.15	**14.68**	**18.90**
Arka-Tsoma	**3.34**	**4.63**	0.82	**6.05**	**3.29**	0.34	**42.42**
Arka-Garcho	**3.73**	1.51	1.85	**29.54**	**3.41**	**68.46**	**45.79**
Basa-Tsoma	0.35	1.62	0.75	**3.56**	**2.97**	**5.15**	**23.72**
Basa-Garcho	0.14	1.05	1.67	**21.91**	**3.26**	**62.86**	**25.56**
Tsoma-Garcho	0.27	**3.25**	0.58	**5.12**	**5.79**	**20.32**	0.00

Table C-59: Mogesa individual used-up scraper mean measurements and variance.

Individual	Breadth	Length	Proximal Thickness	Distal Thickness	Breadth/ Length Ratio	Thickness/ Length Ratio	Retouch Length
Buta (n=70)	2.56 (0.37)	3.03 (0.33)	1.11 (0.08)	0.91 (0.10)	0.80 (0.02)	0.33 (0.01)	1.06 (0.11)
Tesfy (n=50)	2.49 (0.11)	3.18 (0.29)	1.25 (0.06)	0.99 (0.06)	0.87 (0.04)	0.32 (0.02)	1.04 (0.06)
Goa (n=26)	2.52 (0.17)	3.15 (0.28)	1.22 (0.12)	0.87 (0.08)	0.82 (0.04)	0.29 (0.02)	0.97 (0.12)
Mokano (n=22)	2.37 (0.04)	2.86 (0.15)	1.15 (0.09)	0.96 (0.12)	0.84 (0.01)	0.35 (0.02)	0.90 (0.06)
Mola (n=21)	2.41 (0.07)	3.51 (0.37)	1.19 (0.10)	0.91 (0.14)	0.70 (0.02)	0.26 (0.01)	0.98 (0.11)
Yonja (n=21)	2.5 (0.11)	3.29 (0.28)	1.11 (0.07)	0.8 (0.05)	0.78 (0.04)	0.25 (0.1)	1.09 (0.09)
Yeka (n=68)	2.62 (0.07)	2.47 (0.08)	1.01 (0.06)	0.97 (0.19)	1.08 (0.03)	0.40 (0.1)	1.04 (0.07)

Table C-60: Mogesa t-test results for used-up scrapers (T-critical is 1.96, bolded cells are significant at the 0.05 confidence level).

Individual	**Breadth**	**Length**	**Proximal Thickness**	**Distal Thickness**	**Breadth/ Length Ratio**	**Thickness/Length Ratio**	**Retouch Length**
Tesfy & Buta	**4.8**	**2.02**	**10.37**	**4.83**	**12.13**	**2.88**	1.01
Tesfy & Goa	**2.16**	0.45	**3.02**	**7.2**	**3.35**	**12.90**	**3.07**
Tesfy & Mokano	**3.51**	**4.8**	**8.8**	1.3	**7.97**	**5.33**	**2.81**
Tesfy & Mola	1.39	**3.98**	1.75	**3.25**	**19.23**	**18.97**	**3.16**
Tesfy & Yonja	1.81	1.37	**5.85**	**12.5**	**2.58**	**22.39**	**8.4**
Tesfy &Yeka	**10.49**	**19.29**	**13.43**	1.49	**63.15**	**30.07**	0.25
Buta & Goa	1.17	1.18	**4.12**	1.81	**5.73**	**8.48**	**3.04**
Buta & Mokano	**6.56**	**2.77**	0.03	1.99	**4.16**	**6.76**	1.31
Buta & Mola	**4.71**	**5.32**	**4.6**	0	**20.03**	**13.39**	**2.98**
Buta & Yonja	1.82	**2.8**	1.63	**4.88**	**9.57**	**15.96**	**5.86**
Buta & Yeka	**3.37**	**14.68**	1.05	**4.25**	**37.86**	**31.16**	0.90
Goa & Mokano	**3.9**	**4.28**	**3.21**	**3.26**	1.88	**14.24**	**3.67**
Goa & Mola	**2.5**	**3.82**	0.69	1.22	**13.87**	**7.52**	0.16
Goa & Yonja	0.43	1.65	1.7	**3.73**	**3.70**	**11.33**	**2.59**
Goa & Yeka	**3.9**	**18.57**	**5.48**	**6.6**	**38.29**	**41.23**	**3.26**
Mokano & Mola	**2.57**	**7.61**	**3.48**	1.3	**32.14**	**18.51**	**3.63**
Mokano & Yonja	**5.21**	**6.1**	1.41	**6.04**	**6.84**	**21.22**	**7.35**
Mokano & Yeka	**15.67**	**16.16**	0.78	0.53	**42.87**	**14.99**	**2.5**
Mola & Yonja	**2.9**	**2.22**	**2.15**	**3.43**	**9.32**	**3.54**	**2.29**
Mola & Yeka	**11.38**	**22.24**	**5.88**	**2.81**	**63.26**	**46.47**	**3.3**
Yonja & Yeka	**5.82**	**21.84**	**2.69**	**11.81**	**41.83**	**50.84**	**7.79**

Table C-61: Amure individual used-up scraper mean measurements and variance.

Individual	Breadth	Length	Proximal Thickness	Distal Thickness	Breadth/ Length Ratio)	Thickness/ Length Ratio	Retouch Length
Hanicha (n=44)	2.31 (.07)	2.76 (.17)	1.08 (.08)	0.79 (.07)	0.85 (.02)	0.30 (.01)	0.92 (.11)
Osha (n=28)	2.34 (.11)	2.66 (.07)	1.11 (.07)	0.88 (.10)	0.89 (.04)	0.33 (.02)	0.89 (.11)
Galche (n=33)	2.35 (.08)	2.53 (.18)	1.03 (.05)	0.92 (.06)	0.95 (.03)	0.37 (.02)	1.08 (.07)
Bedala (n=30)	2.4 (.11)	2.72 (.16)	1.12 (.08)	0.99 (.08)	0.90 (.04)	0.37 (.01)	1.19 (.15)
Gamana (n=18)	2.41 (.18)	2.95 (.25)	1.1 (.15)	0.83 (.09)	0.84 (.04)	0.29 (.01)	0.86 (.09)
Mardos (n=25)	1.98 (.08)	2.5 (.20)	1.18 (.10)	0.86 (.07)	0.82 (.04)	0.36 (.02)	0.89 (.07)
Hagay (n=14)	2.26 (.13)	2.35 (.24)	1.11 (.07)	1.01 (.06)	1.02 (.12)	0.46 (.04)	1.07 (.05)
Chamo (n=19)	2.45 (1.1)	2.54 (.29)	1.14 (.09)	0.98 (.08)	0.99 (.03)	0.40 (.01)	1.01 (.08)

Table C-62: Amure t-test results for used-up scrapers (T-critical is 1.96, bolded cells are significant at the 0.05 confidence level).

Individual	Breadth	Length	Proximal Thick ness	Distal Thick	Breadth/ Length	Thicknes s/Length	Retouch Length
Hanicha & Osha	1.42	**2.91**	1.63	**4.49**	**5.46**	**10.67**	1.13
Hanicha & Galche	**2.33**	**5.50**	**3.16**	**8.56**	**14.60**	**22.71**	**7.31**
Hanicha & Bedala	**4.30**	0.85	**2.11**	**11.39**	**6.69**	**24.08**	**8.93**
Hanicha & Gamana	**3.17**	**3.52**	0.68	1.88	1.85	**2.69**	**2.05**
Hanicha & Mardos	**17.87**	**3.41**	**4.55**	**3.99**	**4.72**	**16.61**	1.23
Hanicha & Hagay	1.86	**6.94**	1.26	**10.57**	**8.66**	**24.86**	**4.92**

Table C-62 continued.

Hanicha & Chamo	**6.08**	**3.71**	**3.07**	**9.47**	**18.49**	**27.27**	**3.57**
Osha & Galche	0.41	**3.38**	**5.19**	1.93	**5.98**	**9.80**	**8.17**
Osha & Bedala	**2.08**	**2.02**	0.51	**4.64**	1.00	**10.12**	**8.63**
Osha & Gamana	1.64	**5.93**	0.31	1.72	**4.63**	**10.65**	0.97
Osha & Mardos	**13.48**	1.84	**2.98**	0.83	**7.10**	**5.70**	0.00
Osha & Hagay	**2.09**	**6.22**	0.00	**4.46**	**4.99**	**15.55**	**5.80**
Osha&Chamo	**3.36**	**2.08**	1.71	**3.64**	**9.13**	**14.29**	**4.41**
Galche & Bedala	**2.08**	**4.38**	**5.41**	**3.95**	**4.74**	**0.87**	**3.79**
Galche & Gamana	1.65	**6.86**	**2.46**	**4.28**	**10.32**	**19.53**	**9.68**
Galche & Mardos	**17.44**	0.39	**7.48**	**3.51**	**13.66**	**3.15**	**10.24**
Galche & Hagay	**2.91**	**2.84**	**4.44**	**4.70**	**3.03**	**10.92**	0.48
Galche & Chamo	1.58	0.05	**6.20**	**3.07**	**4.74**	**4.66**	**2.82**
Bedala & Gamana	0.24	**3.87**	0.60	**6.40**	**5.36**	**22.58**	**8.45**
Bedala & Mardos	**15.90**	**2.55**	**2.47**	**6.35**	**7.92**	**2.71**	**9.19**
Bedala & Hagay	**3.71**	**6.08**	0.40	0.83	**4.63**	**11.81**	**2.90**
Bedala & Chamo	1.55	**2.87**	1.22	0.43	**7.92**	**6.51**	**4.54**
Gamana & Mardos	10.61	**3.86**	**2.10**	1.23	1.63	**14.83**	1.23
Gamana & Hagay	2.63	**6.84**	0.23	**6.44**	**5.91**	**18.61**	**7.82**
Gamana & Chamo	0.82	**4.60**	1.24	**5.36**	**12.26**	**26.44**	**5.72**
Mardos & Hagay	**8.35**	1.16	**2.31**	**6.74**	**7.68**	**11.31**	**8.47**
Mardos & Chamo	**16.42**	0.31	1.03	**5.30**	**15.29**	**7.24**	**5.74**
Hagay & Chamo	**4.54**	1.93	1.73	1.18	0.75	**7.13**	**2.06**

Table C-63: Eeyahoo individual used-up scraper mean measurements and variance.

Individual	**Breadth**	**Length**	**Proximal Thickness**	**Distal Thickness**	**Breadth/ Length Ratio**	**Thickness/ Length Ratio**	**Retouch Length**
Arba (n=50)	2.74 (0.29)	2.45 (0.25)	1.25 (0.14)	0.84 (0.09)	0.86 (0.07)	0.25 (0.01)	0.87 (0.14)
Amaylo (n=57)	2.62 (0.26)	3.27 (0.49)	1.15 (0.17)	0.76 (0.09)	0.83 (0.04)	0.24 (0.01)	0.89 (0.12)
Awesto (n=67)	2.01 (0.11)	3.29 (0.37)	0.71 (0.11)	0.94 (0.16)	0.88 (0.05)	0.26 (0.02)	0.62 (0.09)
Anko (n=11)	3.43 (0.23)	2.46 (0.49)	1.06 (0.16)	1.35 (0.05)	1.45 (0.36)	0.12 (0.01)	1.00 (0.09)

Table C-64: Eeyahoo t-test results for used-up scrapers (T-critical is 2.00, bolded cells are significant at the 0.05 confidence level).

Individual	**Breadth**	**Length**	**Proximal Thickness**	**Distal Thickness**	**Breadth/ Length Ratio**	**Thickness/ Length Ratio**	**Retouch Length**
Arba & Amaylo	**2.04**	**118.76**	**3.44**	**4.02**	**3.12**	**5.40**	0.89
Arba & Awesto	**17.10**	**18.33**	**11.21**	**12.41**	1.66	**3.11**	**6.54**
Arba & Anko	**7.49**	0.38	**2.509**	**5.41**	**11.01**	**53.85**	**3.93**
Amaylo & Awesto	**16.02**	0.41	**7.05**	**9.06**	**5.99**	**6.69**	**8.5**
Amaylo & Anko	**9.72**	**23.41**	**3.93**	**8.58**	**13.09**	**29.40**	**4.02**
Awesto & Anko	**32.5**	**6.99**	**8.48**	**13.52**	**12.51**	**23.88**	**9.14**

Table C-65: Patela individual used-up scraper mean measurements. The total number here for Patela is 4 less than in Chapter 5 because I did not include one young individual and his 4 scrapers here.

Individual	**Breadth (variance)**	**Length (variance)**	**Proximal Thickness (variance)**	**Distal Thickness (variance)**	**Breadth/ Length Ratio (variance)**	**Thickness/ Length Ratio (variance)**	**Retouch Length (variance)**
Gaga (n=13)	1.93 (0.16)	2.28 (0.21)	1.01 (0.08)	0.75 (0.07)	0.86 (0.02)	0.34 (0.02)	0.72 (0.06)
Tina (n=25)	2.3 (0.13)	2.27 (0.11)	1.08 (0.07)	0.91 (0.07)	1.02 (0.03)	0.40 (0.01)	0.93 (0.07)
Uma (n=12)	2.5 (0.19)	2.64 (0.27)	1.24 (0.18)	1.01 (0.21)	0.96 (0.01)	0.38 (0.02)	0.81 (0.07)
Unkay (n=28)	1.24 (0.18)	2.58 (0.43)	1.06 (0.09)	0.81 (0.07)	1.02 (0.07)	0.36 (0.03)	1.06 (0.27)
Garbo (n=24)	2.17 (0.11)	2.38 (0.56)	1.22 (0.23)	0.76 (0.07)	0.97 (0.06)	0.34 (0.01)	1.05 (0.17)
Tinko (n=17)	2.23 (0.14)	2.47 (0.35)	1.06 (0.09)	0.76 (0.13)	0.94 (0.05)	0.31 (0.02)	1.06 (0.27)
Darsa (n=24)	2.27 (0.18)	2.41 (0.25)	1.03 (0.12)	0.84 (0.11)	0.96 (0.03)	0.37 (0.03)	0.82 (0.07)
Abata (n=16)	2.37 (0.26)	2.3 (0.12)	1.04 (0.06)	0.81 (0.12)	1.05 (0.07)	0.36 (0.03)	0.81 (0.13)
Arka (n=25)	2.36 (0.21)	2.68 (0.48)	0.93 (0.06)	0.62 (0.07)	0.92 (0.05)	0.26 (0.02)	0.69 (0.09)
Basa (n=7)	2.11 (0.13)	2.26 (0.19)	1.1 (0.15)	0.9 (0.13)	0.95 (0.02)	0.41 (0.03)	0.86 (0.19)
Tsoma (n=14)	2.01 (0.09)	2.11 (0.12)	0.96 (0.05)	0.82 (0.07)	0.97 (0.03)	0.39 (0.01)	0.93 (0.10)

Table C-66: Patela t-test results for used-up scrapers (T-critical is 2.04, bolded cells are significant at the 0.05 confidence level).

Individual	Breadth	Length	Proximal Thickness	Distal Thickness	Breadth/Length Ratio	Thickness/ Length Ratio	Retouch Length
Gaga- Tina	**7.90**	0.12	**31.44**	**6.68**	**17.93**	**13.38**	**9.19**
Gaga-Uma	**8.51**	**3.81**	**3.10**	**4.22**	**12.51**	**4.88**	**6.58**
Gaga-Unkay	**12.00**	**2.42**	1.71	**2.55**	**8.30**	1.66	**4.46**
Gaga-Garbo	**5.57**	0.69	0.86	0.41	**6.47**	1.17	**3.59**
Gaga-Tinko	**5.83**	1.75	1.04	0.25	**5.38**	**4.35**	**3.50**
Gaga-Darsa	**5.80**	1.59	0.54	**2.66**	**11.09**	**2.70**	**4.79**
Gaga-Abata	**5.40**	0.37	1.15	1.59	**9.07**	1.67	1.92
Gaga-Arka	**6.70**	**2.90**	**3.47**	**5.43**	**4.40**	**11.10**	1.08
Gaga-Basa	**2.67**	0.21	1.77	**3.39**	**8.28**	**5.92**	**2.38**
Gaga-Tsoma	1.64	**2.53**	1.96	**2.60**	**10.51**	**8.63**	**6.55**
Tina- Uma	**3.95**	**6.99**	**11.68**	**2.17**	**7.50**	**5.77**	**3.06**
Tina-Unkay	**24.31**	**3.60**	**33.12**	**5.19**	0.35	**8.32**	**2.34**
Tina-Garbo	**3.77**	1.04	**31.26**	**7.50**	**4.55**	**19.95**	**4.79**
Tina-Tinko	1.42	**2.82**	**25.58**	**4.84**	**7.35**	**18.74**	**3.82**
Tina-Darsa	0.67	**2.68**	**27.57**	**2.67**	**8.95**	**5.61**	**5.00**
Tina-Abata	1.15	1.14	**35.79**	**3.38**	1.74	**8.36**	**3.31**
Tina-Arka	1.42	**4.29**	**47.18**	**14.65**	**9.73**	**27.59**	**10.52**
Tina-Basa	**3.42**	0.40	**17.84**	0.27	**6.73**	0.85	1.50
Tina-Tsoma	**7.22**	**6.86**	**39.51**	**3.85**	**6.24**	**2.98**	0.00
Uma-Unkay	**20.12**	0.41	**3.19**	**4.55**	**3.05**	**2.43**	0.12
Uma-Garbo	**6.82**	1.48	**4.27**	**5.33**	0.43	**7.83**	**5.34**
Uma-Tinko	**4.41**	1.41	**2.60**	**3.96**	1.49	**8.81**	**4.39**
Uma-Darsa	**3.70**	**2.55**	**3.28**	**3.21**	0.50	0.96	**5.53**

Table C-66 continued.

Uma-Abata	1.57	**4.53**	**3.01**	**3.19**	**4.32**	**2.40**	**3.83**
Uma-Arka	1.95	0.31	**5.98**	**8.46**	**2.92**	**15.13**	**8.47**
Uma-Basa	**4.91**	**3.31**	1.23	1.25	1.53	**2.85**	**2.21**
Uma-Tsoma	**8.58**	**6.69**	**4.13**	**3.19**	0.71	**2.65**	**2.23**
Unkay-Garbo	**22.01**	1.43	**2.88**	**2.57**	**3.03**	**3.23**	**4.16**
Unkay-Tinko	**19.56**	0.92	0.32	1.68	**4.36**	**5.86**	**3.36**
Unkay-Darsa	**20.57**	1.76	1.03	1.19	**4.40**	1.43	**4.05**
Unkay-Abata	**17.00**	**2.56**	0.79	0.00	1.53	0.02	**3.37**
Unkay-Arka	**21.09**	0.81	6.11	**9.86**	**6.24**	**13.75**	**6.53**
Unkay-Basa	**11.97**	1.94	0.91	**2.53**	**2.78**	**4.54**	1.83
Unkay-Tsoma	**14.84**	**3.97**	**3.86**	0.44	**2.86**	**4.79**	1.73
Garbo-Tinko	1.79	0.53	1.93	0.00	1.69	**4.86**	0.33
Garbo-Darsa	**2.32**	0.16	1.50	**3.01**	0.88	**4.55**	0.43
Garbo-Abata	**3.36**	0.62	1.99	1.67	**4.18**	**3.25**	0.25
Garbo-Arka	**4.15**	2.00	1.99	**7.00**	**3.20**	**14.11**	**5.05**
Garbo-Basa	1.22	0.60	**2.34**	**3.79**	0.87	**8.87**	0.77
Garbo-Tsoma	**4.47**	1.80	0.64	**2.55**	0.06	**13.19**	**3.49**
Tinko-Darsa	0.57	0.66	0.53	**2.13**	1.50	**6.54**	0.00
Tinko-Abata	1.80	1.83	0.30	1.15	**5.34**	**5.58**	0.43
Tinko-Arka	**2.23**	1.58	**4.29**	**4.52**	1.25	**7.24**	**4.73**
Tinko-Basa	**2.11**	1.50	0.86	**2.40**	0.50	**8.68**	0.50
Tinko-Tsoma	**5.15**	**3.61**	**2.62**	1.55	1.90	**12.73**	**2.77**

Table C-66 continued.

Darsa-Abata	1.44	1.58	0.31	0.81	**6.00**	1.22	0.54
Darsa-Arka	1.79	**2.51**	**3.71**	**8.39**	**3.35**	**13.79**	**6.06**
Darsa-Basa	**2.18**	1.45	1.29	1.22	0.75	**3.20**	0.63
Darsa-Tsoma	**4.96**	**4.08**	**2.07**	0.61	1.16	**2.91**	**3.62**
Abata-Arka	0.00	**3.12**	**5.73**	**6.42**	**7.16**	**12.40**	**3.50**
Abata-Basa	**2.49**	0.65	1.40	1.62	**3.69**	**4.25**	0.72
Abata-Tsoma	**4.87**	**4.26**	**3.93**	0.27	**4.16**	**4.87**	**2.80**
Arka-Basa	**3.09**	**2.28**	**4.63**	**7.66**	1.55	**13.41**	2.07
Arka-Tsoma	**6.02**	**4.33**	1.59	**8.56**	**3.41**	**19.39**	**4.38**
Basa-Tsoma	1.96	**2.14**	**3.22**	1.85	1.53	1.78	1.08

Table C-67: Chi-square test comparing age and presence of spurs.

	Old and Young	**Others**	
Spurs	50	56	**106**
w/o Spurs	353	912	**1265**
	403	**968**	**1371**
observed	Expected		
50	31.1583	11.394	
353	371.842	0.9547	
56	74.8417	4.7435	
912	893.158	0.3975	
		17.49	
Degrees of freedom	1		
Significance level at0.05 = 3.84			
Since 17.49 is greater than 3.84 it is significant			

Table C-68: Chi-square test comparing age and breaking frequency.

	Young	Middle aged /Old	
Broken	30	12	**42**
Unbroken	150	682	**832**
	180	**694**	**874**
observed	Expected		
30	8.64988558	52.6975046	
150	171.350114	2.66021057	
12	33.3501144	13.6679407	
682	660.649886	0.68996816	
		69.71562	
Degrees of freedom	1		
Significance level at0.05 = 3.84			
Since 69.72 is greater than 3.84 than the differences are significant			

Table C-69: Comparison of experience and standard deviation for unused scrapers of individuals (formula = standard deviation/mean x 100).

Individual	Years Experience	Length SD	Breadth SD	Proximal Thickness SD	Distal Thickness SD
Chamo	2	15.92	17.92	33.64	51.35
Goa	2	12.66	13.20	21.82	38.29
Abata	3	25.42	19.82	56.32	33.33
Gaga	3	19.29	20.92	32.74	45.16
Mardos	3	13.39	10.32	26.45	44.44
Uma	3	21.18	25.11	36.19	25.93
Yonja	4	11.91	14.41	23.33	30.33
Arba	5	25.49	21.59	34.16	43.51
Bedala	5	15.21	16.86	21.71	36.84
Galche	5	12.68	21.27	26.61	33.33
Mola	5	12.67	9.34	22.03	32.23
Tsoma	6	21.49	27.36	43.68	65.52
Awesto	7	24.51	26.40	30.63	52.67
Osha	7	10.03	13.73	22.12	33.33
Tinko	7	18.08	26.82	86.67	40.00
Tesfy	8	8.55	12.23	23.82	27.78
Amaylo	9	20.95	23.82	40.24	35.60

Table C-69 continued.

Garbo	9	25.87	18.40	34.09	30.77
Unkay	9	34.62	32.84	47.00	37.50
Basa	10	25.92	25.85	40.48	34.38
Tina	12	22.68	25.96	42.59	33.33
Gamana	15	14.29	15.81	29.73	44.12
Darsa	20	18.25	20.18	36.08	31.58
Hagay	20	15.22	17.35	30.56	58.82
Mokano	20	14.86	11.28	23.24	25.58
Arka	30	21.43	17.86	36.90	23.53
Buta	30	12.15	13.40	23.48	25.10
Garcho	35	22.21	24.14	34.83	42.31
Yeka	35	13.73	12.22	19.80	34.21
Hanicha	40	19.14	16.74	31.25	48.28

Table 70: Comparison of experience and standard deviation for used-up scrapers of individuals.

Individual	Years Experience	Length SD	Breadth SD	Proximal Thickness SD	Distal Thickness SD
Chamo	2	21.29	13.47	26.96	27.55
Goa	2	16.83	16.67	26.75	32.05
Abata	3	15.22	21.52	49.04	41.98
Gaga	3	20.20	20.21	28.71	36.00
Mardos	3	18.00	14.14	27.12	30.23
Uma	3	19.68	17.53	38.52	44.55
Yonja	4	16.13	13.20	25.27	27.50
Arba	5	18.54	19.74	29.55	37.08
Bedala	5	14.69	13.75	25.00	29.29
Galche	5	16.97	11.91	22.33	26.09
Mola	5	17.10	11.18	28.71	41.56
Tsoma	6	18.92	15.92	33.33	32.93
Awesto	7	20.41	15.88	42.61	46.48
Osha	7	10.16	14.10	24.32	36.36
Tinko	7	23.88	16.52	32.38	48.68
Tesfy	8	16.97	13.06	19.17	25.15
Amaylo	9	21.71	19.41	35.68	39.22
Garbo	9	31.40	15.21	33.67	34.21
Unkay	9	25.52	14.52	29.25	33.33

Table 70 continued

Basa	10	19.49	17.54	35.45	41.11
Tina	12	14.96	15.65	15.00	28.57
Gamana	15	16.95	17.84	35.45	36.14
Darsa	20	20.76	18.94	41.75	39.29
Hagay	20	20.85	16.37	23.42	23.76
Mokano	20	13.62	8.45	23.35	35.18
Arka	30	26.04	19.41	26.88	41.94
Buta	30	18.60	14.07	25.13	35.00
Yeka	35	11.35	11.07	22.70	25.60
Hanicha	40	14.87	11.26	25.93	34.18

APPENDIX D
SCRAPER GRAPHS

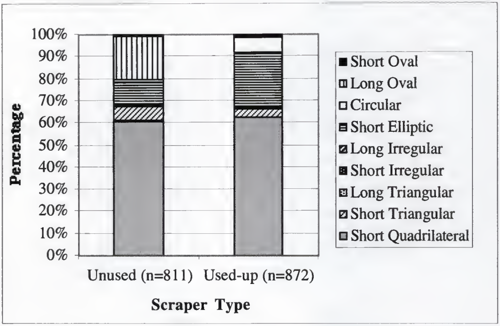


Figure D-1: Graph comparing the planform of unused and used-up scrapers.

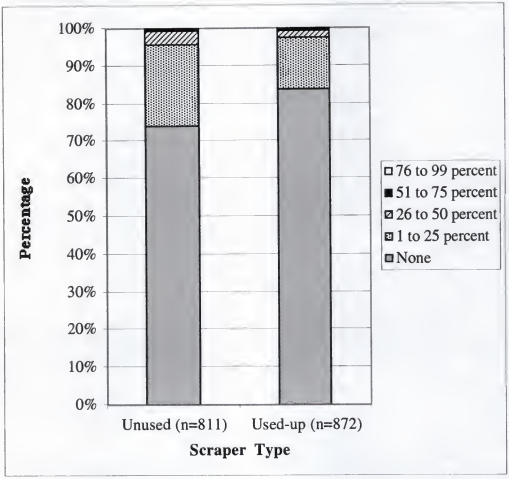


Figure D-2: Graph comparing the percentage of cortex on unused and used-up scrapers.

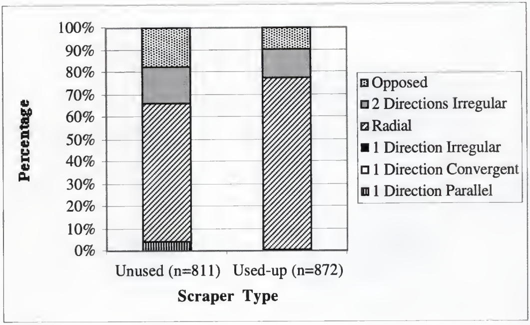


Figure D-3: Graph comparing the dorsal scar pattern on unused and used-up scrapers.

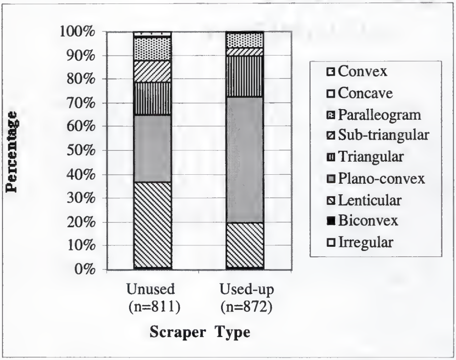


Figure D-4: Graph comparing the cross-section on unused and used-up scrapers.

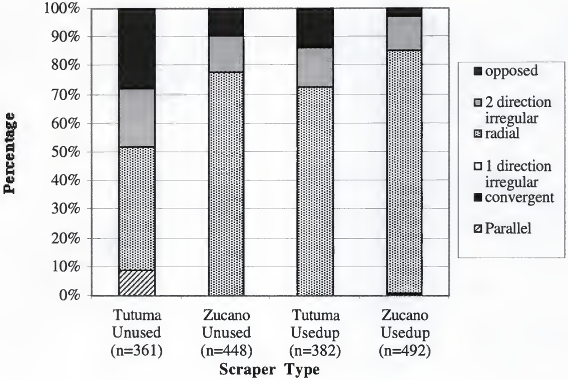


Figure D-5: Graph comparing illustrating the dorsal scar patterns of *zucano* and *tutuma* scrapers.

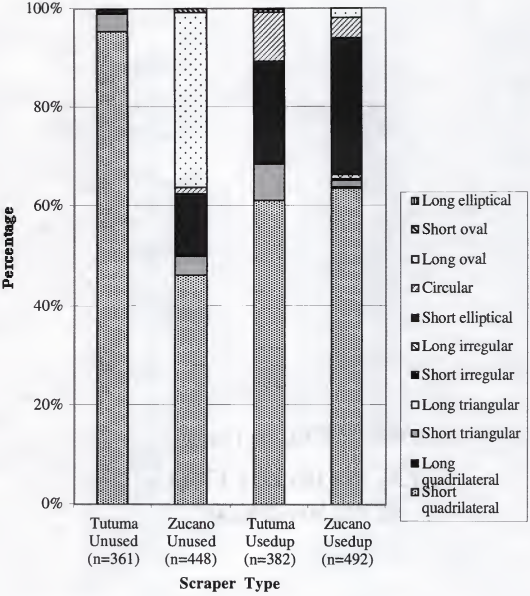


Figure D-6: Graph comparing the planforms of *zucano* and *tutuma* scrapers.

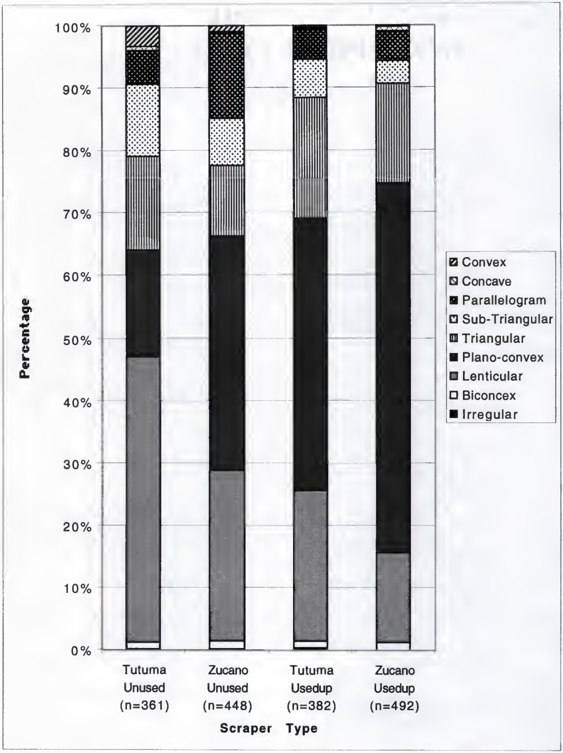


Figure D-7: Graph comparing the cross-sections of *zucano* and *tutuma* scrapers.

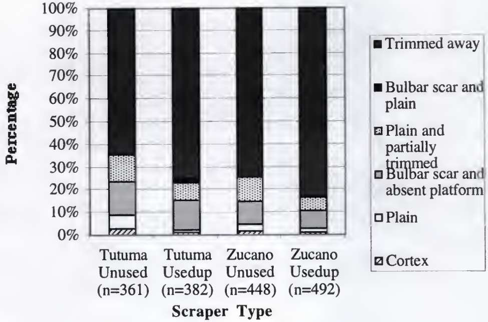


Figure D-7: Graph comparing the platform locations of *zucano* and *tutuma* scrapers.

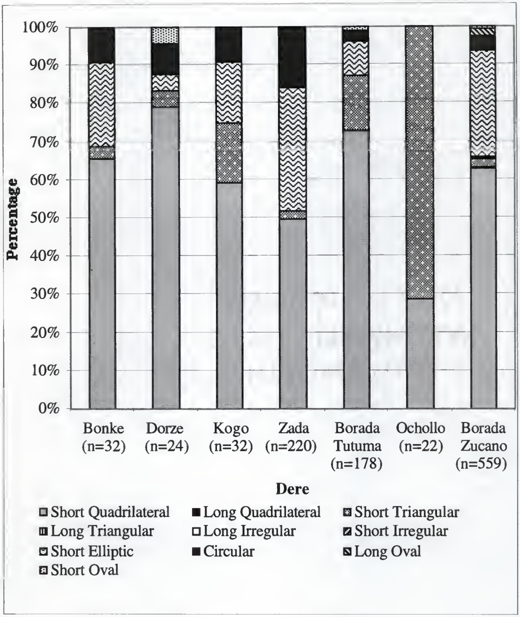


Figure D-8: Graph comparing the planforms of *dere* unused scrapers.

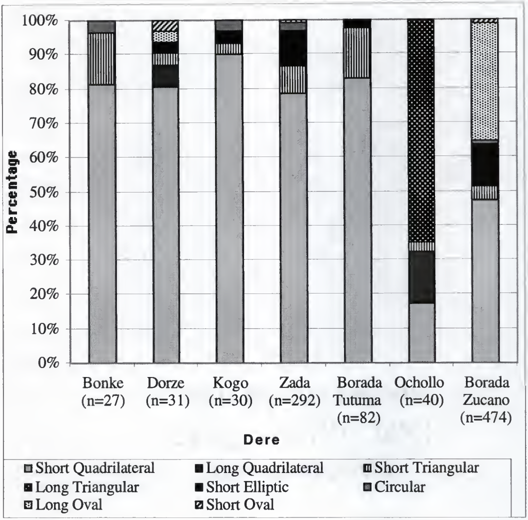


Figure D-9: Graph comparing the planforms of *dere* used-up scrapers.

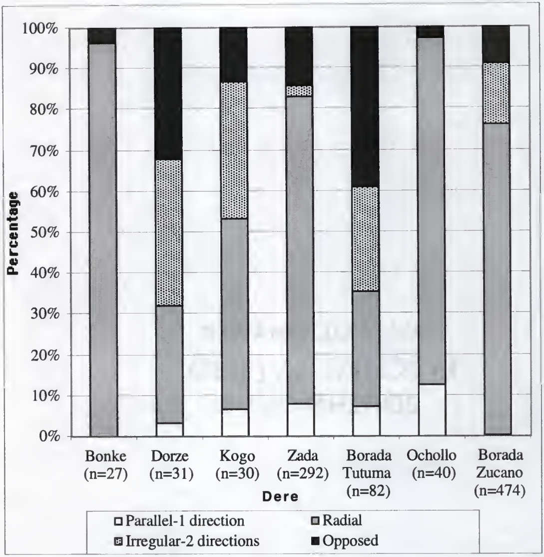


Figure D-10: Graph comparing the dorsal scar of *dere* unused scrapers.

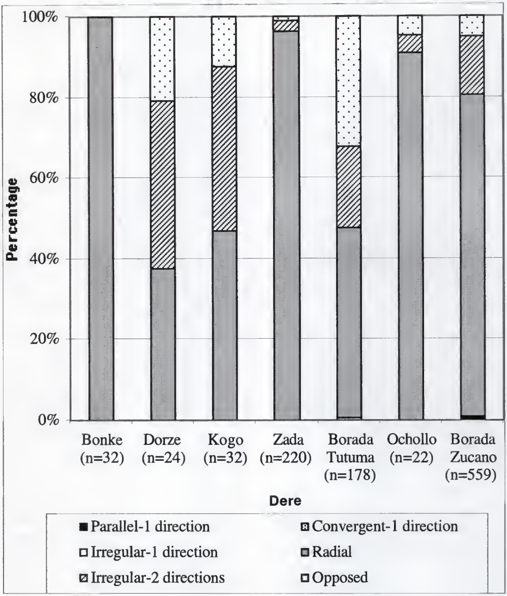


Figure D-11: Graph comparing the dorsal scar of *dere* used-up scrapers.

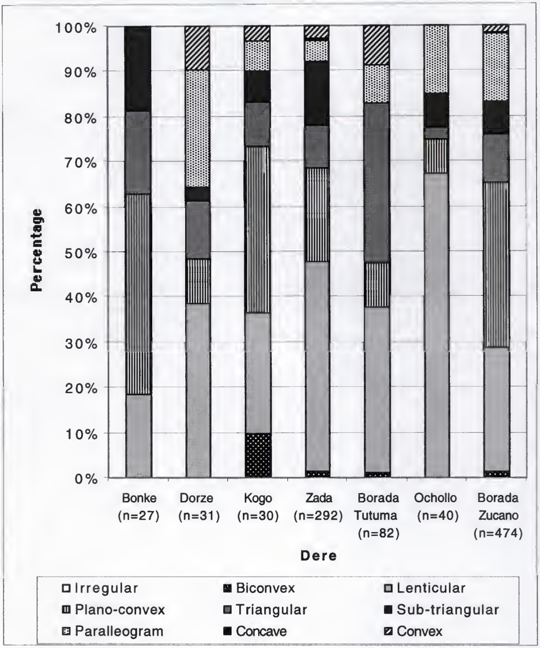


Figure D-12: Graph comparing the cross-section of *dere* unused scrapers.

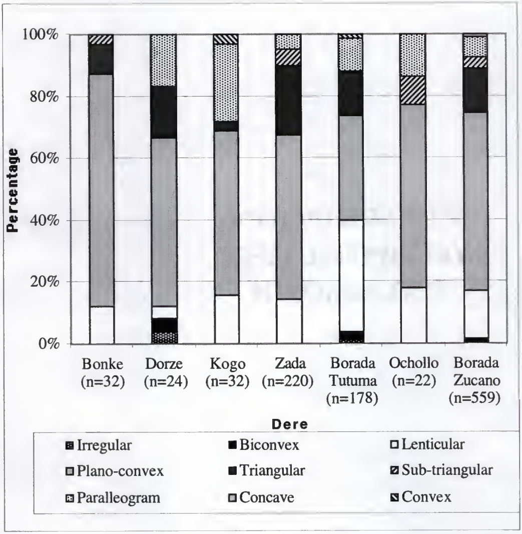


Figure D-13: Graph comparing the cross-section of *dere* used-up scrapers.

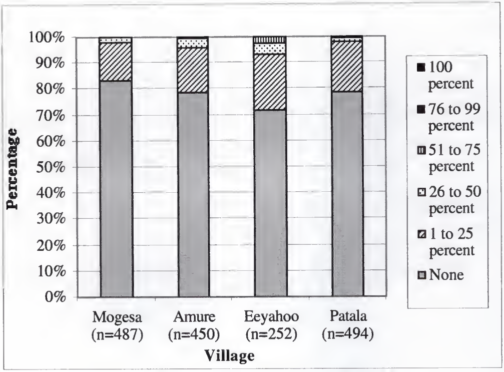


Figure D-14: Graph comparing cortex on unused and used-up scrapers for lineages/villages.

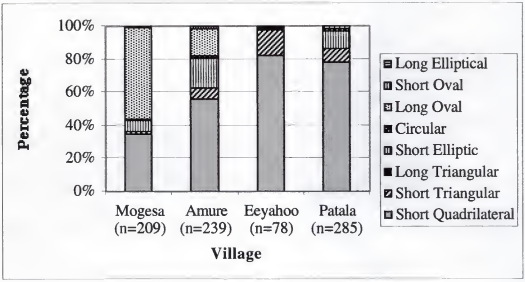


Figure D-15: Graph comparing lineage/village planforms of unused scrapers.

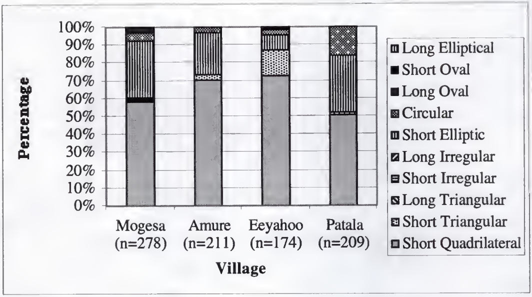


Figure D-16: Graph comparing the planforms of lineage/village used-up scrapers.

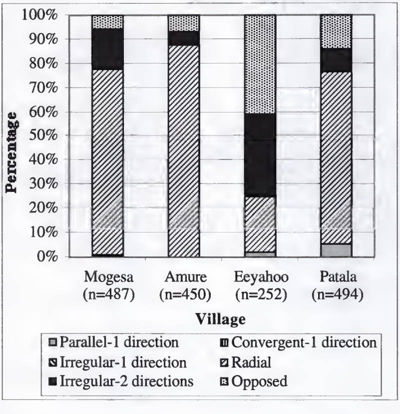


Figure D-17: Graph comparing the dorsal scars of lineage/village scrapers (unused and used-up).

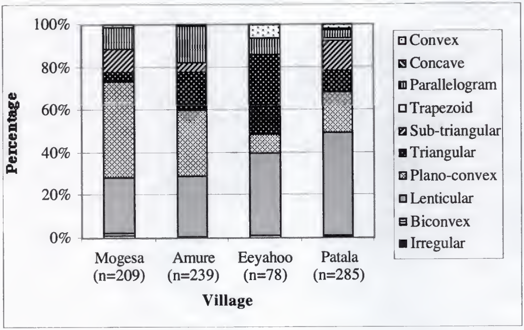


Figure D-18: Graph comparing the cross-section of lineage/village unused scrapers.

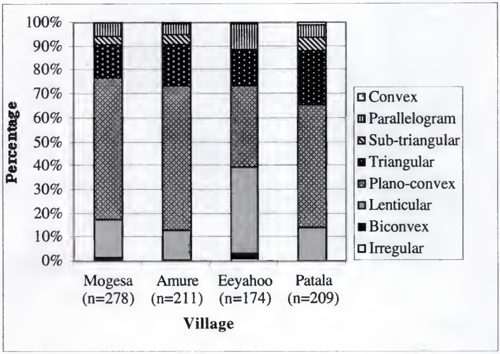


Figure D-19: Graph comparing the cross-section of lineage/village used-up scrapers.

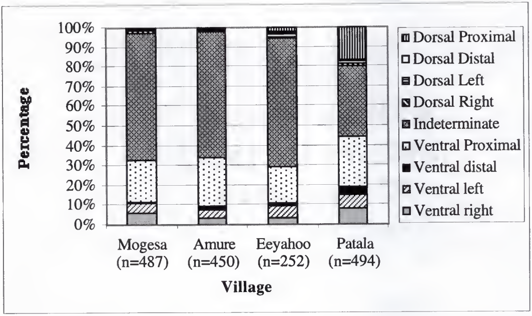


Figure D-20: Graph comparing the platform location of lineage/village scrapers (unused and used-up).

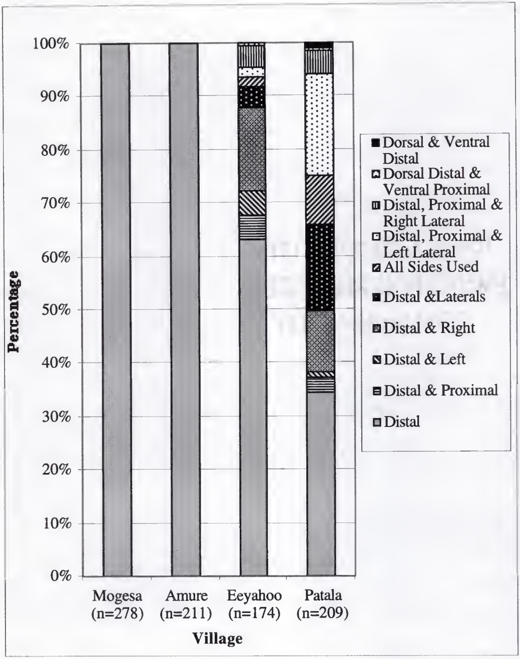


Figure D-21: Graph comparing the retouch location on used-up scrapers of the four different lineage/villages.

APPENDIX E
GLOSSERY

awardjas	political districts designated by the national government
asha	me
baso	lowlands
baira	senior
chancha	resharpening or production waste
chima	old or elder
chinasha	potters
coata	to chop
dana	ritual-sacrificer below the Kao
debusha	meeting place
degala	hide-worker, grindstone-maker, iron smith, lowest caste group
dere	place, political district in this text
dogala	exogamous moiety group
dulata	dignitaries
dulea	proximal end, anus
Eka	ritual specialists below the Kao
Gamocalay	Gamo language
gata	lateral or sides
gatchino	new born
gelba katchay	hide-workers
geza	highlands
goma	taboo
goshay	chert
guta	village
guchay	healing and curing of open wounds
Halaka	village elder/leader
horoso	staff
iffee	eye
isha	brother and patrilineally related males of the same generation
jima	vertical wooden scraping frame
Kao	a ritual scarificer of a political district
katcha	scratch, scrap
katsaro	circumcision
!kaysaro	priest
ketsa	household
kula kula	healing horn
Maga	ritual-sacrificer for village

mala	farmer, highest caste group, citizen or exgamous moiety group
Maka	a ritual scarificer of subdistricts
mana	potter caste group
manacalay	mana language
Maro	diviner
mayla	patron-client system
mota	subdistrict
omo	clan and lineage
oratay	new
owdetso	degala language
sofie	public ceremony and presentation
solloa	obsidian
sucha	stone
tekata	to produce scrapers
tolo	process of hanging hides on a frame
tsoilee	hand plow
tsoma	noncitzen
tukaa	stripes of hide, fat
tutuma	scraping handle with a single haft and no mastic
Uduga	a ritual sacrificer for subdistricts
ulo	stomach, ventral side of stone tool
uncha	fermented bread
wogatchay	smiths
woga	culture, tradition
wotza	to put a scraper in its haft
zucano	scraping handle with two hafts and mastic

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BIOGRAPHICAL SKETCH

I attended the University of Texas at Austin, where I received a BA (1987) and an MA (1993) in Anthropology. During my BA studies in Anthropology at the University of Texas, I attended field schools in southern Italy and excavated Neolithic and Classical period sites. After graduation (1987-1990), I worked at the Institute of Classical Archaeology (UT), and in cultural resource management (CRAM) with Hicks and Company in Austin, Texas (1990-1993), focusing on historical archaeology. I entered the MA archaeology program at The University of Texas at Austin in 1990 with James Denbow (chair), Edwin Wilmsen, and Thomas Hester serving on my committee. My master's thesis focused on the analysis of stone tools from sixteen archaeological sites in the Kalahari, which suggested early interaction between Khoisan and Bantu peoples. In 1993, I began my Ph.D. studies at the University of Florida. I was awarded three dissertation grants, including Fulbright, National Science Foundation, and Leakey Foundation, between 1996 and 1998 to conduct ethnoarchaeological (the study of present day material culture to provide models for testing archaeological remains) field work among the Gamo hide-workers of southern Ethiopia. In addition, to dissertation grants, I was awarded the College of Liberal Arts and Sciences McLaughlin Dissertation Fellowship (1999) and the Ruth McQuown Supplementary Scholarship for Women (1999).

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Steven A. Brandt, Chairman
Associate Professor of Anthropology

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Peter R. Schmidt
Associate Professor of Anthropology

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Anita Spring
Professor of Anthropology

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Michael Moseley
Professor of Anthropology

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Abraham Goldman
Associate Professor of Geography

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Kenneth Sassaman
Assistant Professor of Anthropology

This dissertation was submitted to the Graduate Faculty of the Department of Anthropology in the College of Liberal Arts and Sciences and to the Graduate School and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

May 2000

Dean, Graduate School